FOOD ENGINEERING

December 1952

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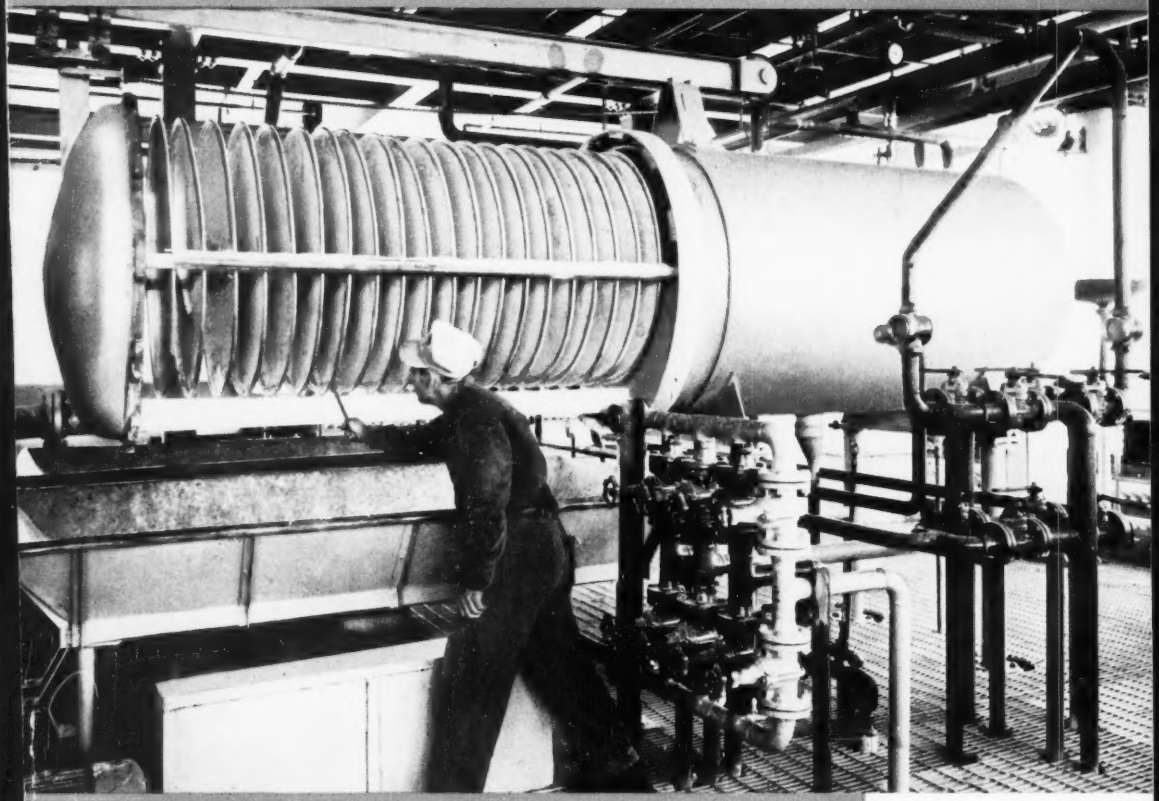
35 CENTS



FAST-CLEANING leaf-type pressure filter in Wonder plant removes fine rice-bran particles from oil-solvent mix. (P. 98)

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Skilled hands in beer making . . .

Skillful handling of beer making

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GRINNELL-SAUNDERS DIAPHRAGM VALVES

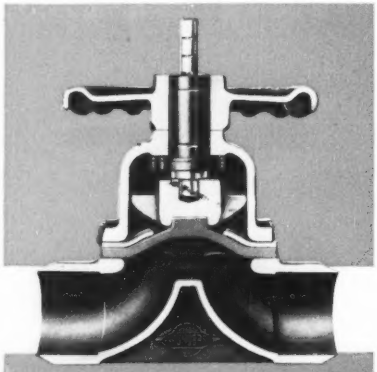
Here's why . . . Streamlined flow. Smooth, streamlined passage, without pockets, prevents trapping of solids and consequent growth of bacteria. Where applicable, polished interiors prevent formation of mold. Frictional resistance is at a minimum—regardless of direction of fluid flow. No disc holder in fluid stream. Self-draining when installed with the spindle at 15 degrees above the horizontal position.

Leak-tight closure against grit, scale, suspended solids. The resilient diaphragm, plus the large area of contact, gives leak-tight closure against pressure or vacuum.

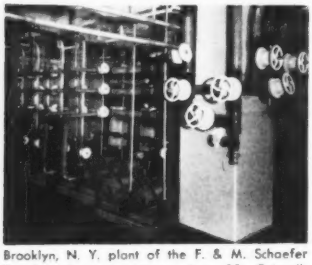
Working parts absolutely isolated from fluid. Diaphragm completely seals off working parts from fluid in the line. No sticking, clogging or corroding of working parts. Valve lubricant cannot contaminate fluids.

Body, lining and diaphragm materials to meet service condition. Bodies stocked in cast iron, malleable iron, stainless steel, bronze and aluminum; other materials on special orders. Valve bodies lined with lead, glass, natural rubber or synthetics.

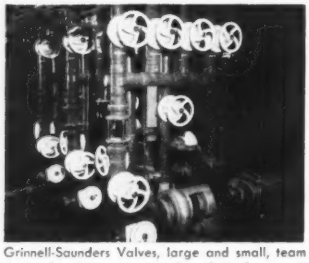
Minimum maintenance. No refacing or reseating is required. No packing glands to demand attention. New diaphragm can be inserted without removing valve body from the line.



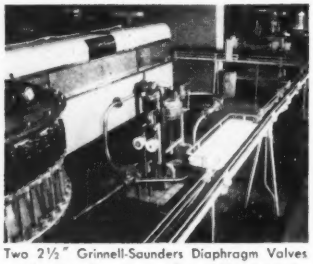
Bronze, socket-end beer valve with a special white diaphragm which imparts no taste or color to beer, and is unaffected by caustic soda or steam cleaning.



Brooklyn, N. Y. plant of the F. & M. Schaefer Brewing Company. More than 20 Grinnell-Saunders Diaphragm Valves are used in this filter operation.



Grinnell-Saunders Valves, large and small, team up on header system leading from four stock houses. Header is used to supply three Diatomaceous filters.



Two 2½" Grinnell-Saunders Diaphragm Valves can be seen in use on a Government meter installation used in the bottling operation at the Schaefer plant.

Write for Grinnell-Saunders Diaphragm Valve catalog

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Food Engineering

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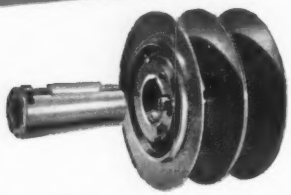
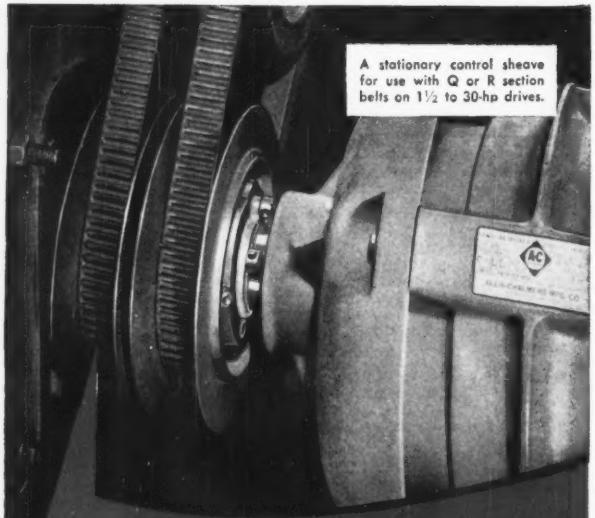
Greatest Name in V-Belt Drives

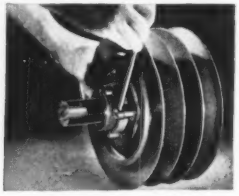




NOW!
Wide Range Vari-Pitch Sheave has 3 New Advantages

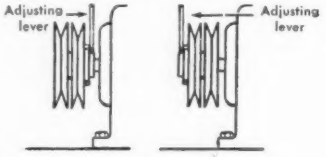
1 Magic-Grip Mounting

The widely used *Magic-Grip* tapered bushing is now supplied with the Wide Range *Vari-Pitch* sheave, making it the fastest mounting sheave of its type on the market. Turning only one screw makes or breaks the vise-like grip of sheave bushing on motor shaft.



2 Fast Adjustment

To change sheave diameter — thereby changing speed — simply turn a single adjusting screw, *using a lever rod* that slips through a hole in the head of the screw. No more fumbling with screw drivers. Adjustment is fast and accurate.



3 Adjusts From Either Side

Sheave can be mounted on motor shaft so adjusting screw is either toward or away from motor bearing, as indicated above. This feature is especially important in installations where space for adjustment is limited. It's the only sheave of its type with this feature.

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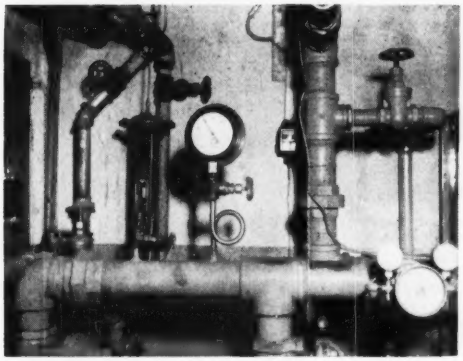
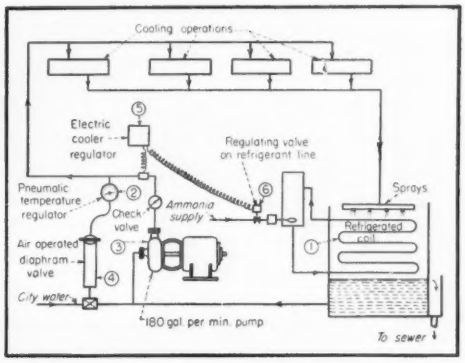
PRACTICAL IDEAS





Novel Cooling-Water System

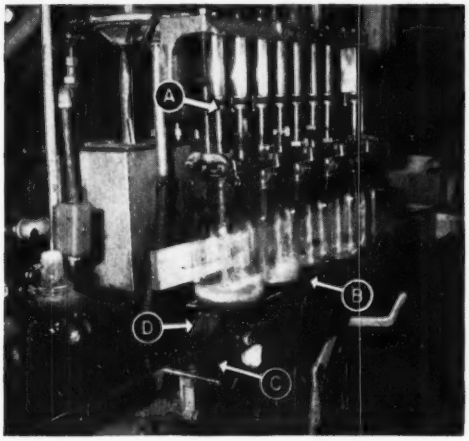
Using inexpensive instrument controls (above), we are able at minimum operating cost, to proportion cold city water makeup in the winter and ammonia refrigerant in the summer, to maintain year round, a uniform 55 deg. F. temperature on our 180 gpm. recirculating chilled water system for plant use.

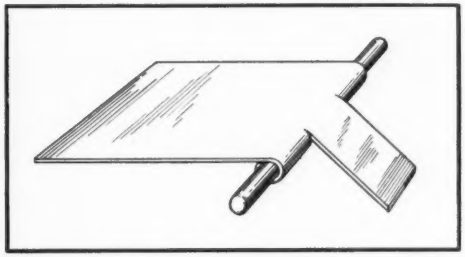
City water, on which process cooling depends during winter months, varies between a low of 38 deg. F. in January and a high of 75 deg. F. in August.

When city water temperature is less than 50-52 deg. F., the ammonia supply to the water cooling coils—(1) in sketch—is off, and a pneumatic temperature regulator—(2)—maintains 55 deg. F. coolant by proportioning the flow of city water to the suction line of the pump (3), and mixing it with warmer return water. This is done with an air operated diaphragm valve (4). Surplus return water overflows to sewer.

During warmer months of the year when city water temperature is above 50-52 deg. F., the water supply system is off and the 55 deg. F. temperature of the cooling water is maintained by an electric temperature regulator (5) which operates a solenoid valve (6) on the ammonia line to the coil cooler.

In order to prevent city water from continuing to flow into the system, during winter operation after pump is shut off, an electric pneumatic relay automatically closes diaphragm valve (4) when pump is down.—*C. F. Ruppert, Chief Engineer, J. O. Welch Co., Cambridge, Mass.*





Hinged Plate Improves Jar Conveyor

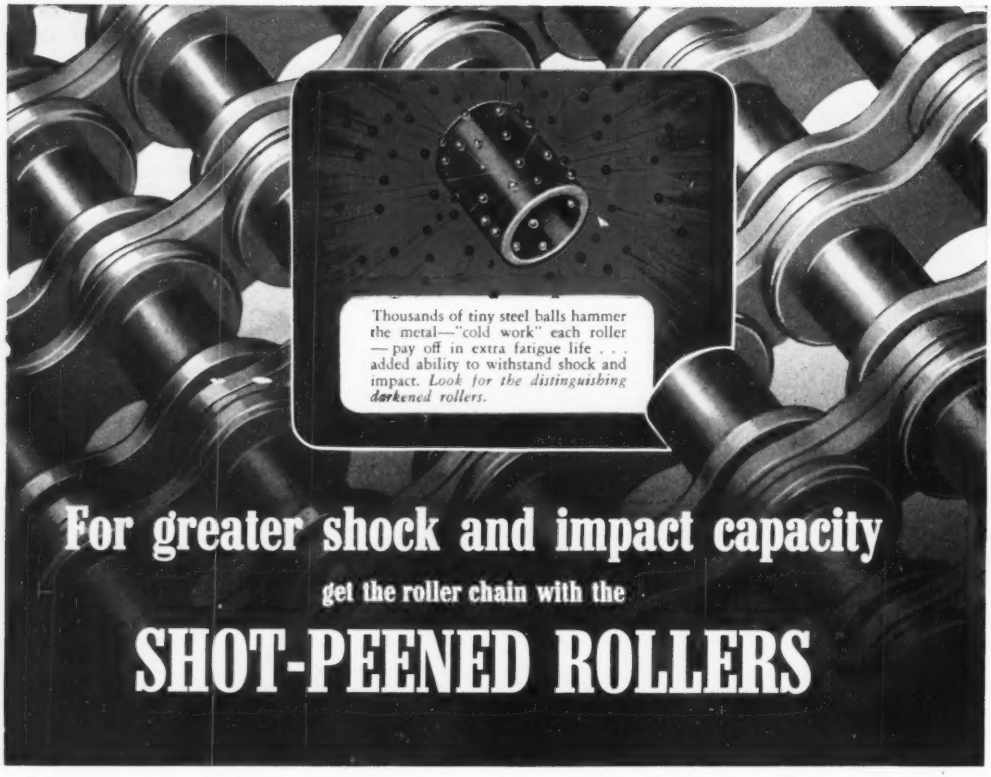
Adding a pivoted metal plate to span the gap between our bottle filler and plate-type conveyor, has greatly decreased jar breakage.

When jars are in position under filling spouts—(A) in photo—the platform (B) on which they rest, is raised to bring the bottle opening against the spout gaskets. When filling is completed, jugs are discharged (as platform lowers) onto conveyor (C), feeding to the closing machine.

Before improvement was made, bottles overturned with considerable jar breakage at the transfer point between platform and conveyor—the hazard least on gallon jugs, most on half gallon and smaller sizes.

Then, installed was transfer plate (D), hinged at the end of the filling platform. When the platform is elevated during filling, the plate which serves as a bridge between platform and conveyor, hangs down at an angle of 45 deg. (see sketch).

As the platform is lowered for jar discharge, the hinged plate rides on the conveyor and is lifted by it until horizontal. Bottles are no longer overturned at the transfer point.—*Russell F. Greenough, Stickney and Poor Spice Co., Boston.*


Thousands of tiny steel balls hammer the metal—"cold work" each roller — pay off in extra fatigue life . . . added ability to withstand shock and impact. *Look for the distinguishing darkened rollers.*

For greater shock and impact capacity

get the roller chain with the

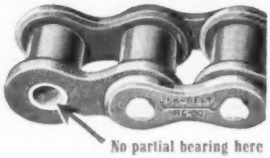
SHOT-PEENED ROLLERS

. . . one of the extra-wear features you get with every LINK-BELT Roller Chain

JUST as shot-peened rollers give you extra fatigue life—so do Link-Belt's exclusive lock-type bushings multiply roller chain's capacity to withstand shock loading. And there are many other engineering extras that make Link-Belt Precision Steel Roller Chain your best buy for drive and conveying service.

You can choose from the complete range of Link-Belt Precision Steel Roller Chain. Ask your nearest Link-Belt office for full particulars on single or multiple widths, in ⅜" through 3" single pitch, or double pitch, 1" through 3".

Lock-type Bushings increase ability to withstand severe operating conditions



No partial bearing here — bushing fits securely

A special manufacturing process securely locks the inside sidebars on the bushing, preventing lateral movement of the sidebars and eliminating a common cause of stiff chains. This Link-Belt development is applied on roller chains through 1" pitch and double pitch roller chains through 2" pitch. 12,698

LINK-BELT

PRECISION STEEL ROLLER CHAIN

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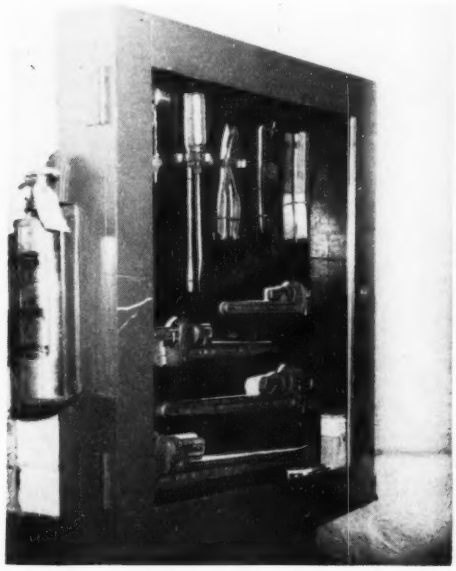
Wax Prevents Tarnish of Motor Parts

Corrosion of motor commutator or slip-ring during periods when motors are idle, can be prevented by the application of paraffin wax.

Use of abrasive brushes will keep these copper parts free of corrosive films while the motor is running. However, a corrosive atmosphere will affect the copper surfaces not covered by brushes during periods when motor is idle. Prolonged action results in an uneven surface of varying resistance for contact beneath the brushes.

Coating surfaces (by wax cake or stick) whenever a motor is not running will prevent corrosive action during non-use periods.—*W. E. Warner, Woodford Green, Essex, England.*



Locked Case For Emergency Tools

Providing—in our refrigeration compressor room—a locked, glass-front case stocked with a full set of emergency tools has not only ended costly tool losses, but also speeded emergency repairs.

Fronting the case with glass (see photo) permits constant inspection for missing tools, when any have been removed for use. Also, though admittedly not new as a tool room procedure, by outlining the background in a contrasting color, the area occupied by each item—tools red, outlines yellow, background black—makes a passing-glance inventory possible. Tool loss has completely ended.

Keeping the case locked may appear incongruous when, in an emergency, tools are needed in a minimum of time. However, obtaining the key from the chief engineer whose desk is nearby consumes little time, when balanced against lost moments and wasted effort trying to track down scattered tools.

Should the engineer be away from his desk the key to the case would be away with him (key is passed from the engineer on duty, to the one succeeding him at the end of each 8-hour shift). In this event, if the key is not immediately available when tools are needed for emergency repairs, instructions are to break the glass front of the case.

Although so far, replacement of the glass front has not been necessary, the cost would be negligible compared to either a consistent loss of tools or the failure to locate a necessary tool at the time of an emergency.—*Erik W. Holgren, Chief Engineer, Abbotts Dairies, Inc., Ice Cream Div., Philadelphia.*

$50 Extra for Best Item

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month you will get an additional payment of $50.

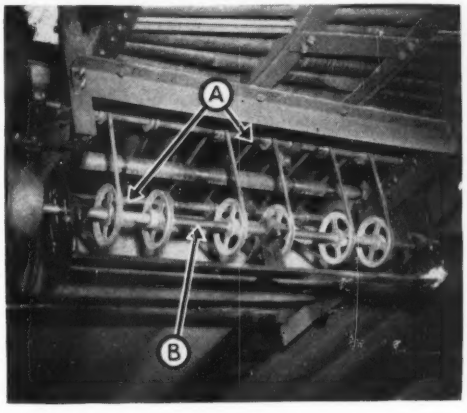
Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

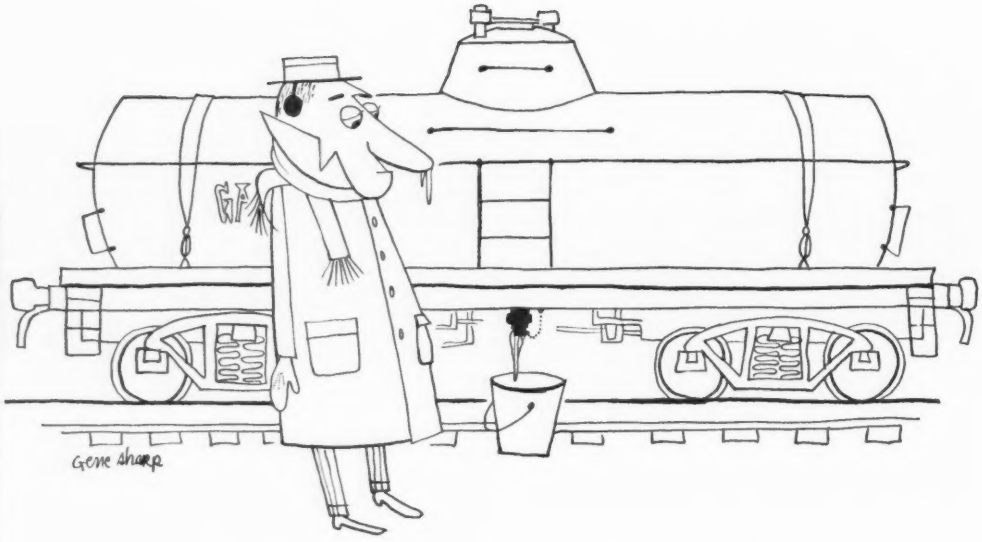
OCTOBER PRACTICAL IDEA voted best was "Can Filler Converted to Jug Filling," submitted by Edgar Hires, Chief Engineer, Chas. E. Hires Co., Philadelphia. It told how a 10-spout No. 10-can unit was simply modified to handle narrow-neck gallon jugs—indexing them accurately and filling them without spillage.



Stops Clogging of Roller Conveyor

Installation of transfer stations between level belt conveyors and roller conveyors feeding casing machines has ended clogging of the roller units at Clark Candy Co., Pittsburgh. Former delays at the casing-machine are now avoided. Here is how the "zip" action transfer stations were constructed:

THE CARE AND NURSING OF TANK CARS



If there's frozen liquid
in the outlet valve:—
unload through the dome.

Another way to get more from your GATX tank cars

GATX GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION
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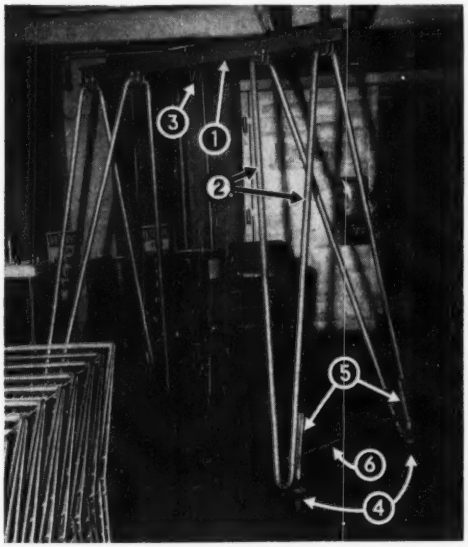
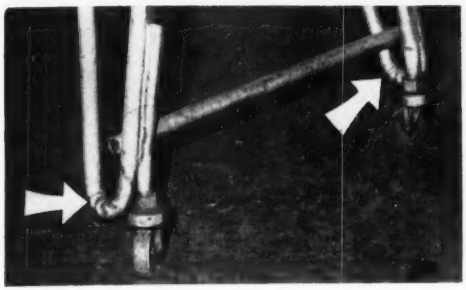
So many people have requested reprints of these cartoon advertisements that we are making them available to you for use in your shops. Just write us.

Belt and roller conveyors were first separated by a space of about 1½ ft. Next, there were obtained a pair of idler shafts—(A) in photo—on which are a series of 2 in. V-belt sheaves. These shafts were mounted so that one is adjacent to the belt conveyor, the other to the rollers. Below the pair of idler shafts, and powered by the belt conveyor motor, is a drive-shaft (B) equipped with 5 in. V-belt sheaves spaced in line with those on the idler shafts. Distance between them is less than the shortest dimension of the cases.

Idler-shafts are so located that when V-belts are in place, level of the latter is slightly higher than that of the rollers, to prevent interference at the transfer point.

Now, with the V-belts geared to a faster speed than the slow moving belt conveyor, cartons are whisked onto the roller conveyor at such speed that they do not lose momentum enroute to the caser.—*FE Staff*





Light Unit Moves Heavy Machines

A lightweight mobile crane for lifting, transporting, and relocating heavy machines or parts, may be constructed relatively simply and inexpensively. The unit can be made quite sturdy with the design we developed, if the correct pipe bending procedure is applied. Here's the story:

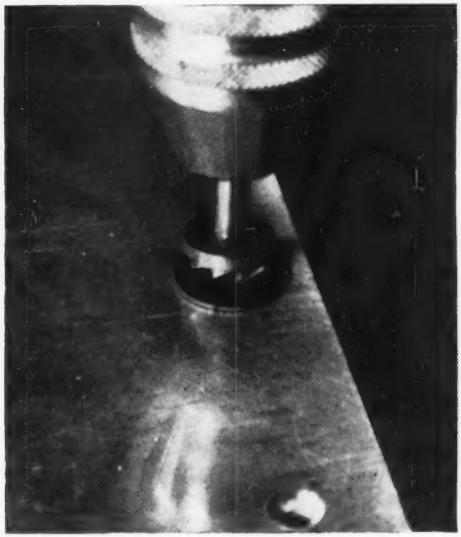
The member to which the hoist is attached is an I-beam —(1) in top photo—to which, at two locations near each end, the pipe supports (2) are anchored. Holes are drilled on each side of the lower surface of the beam at these points, for inserting U-bolts to secure the pipe supports. Each of the center pair of U-bolts (3) to which hoist is hung, is locked into place by nuts on both sides of the lower beam flange.

Casters (4) are provided for easy maneuverability. These are screwed onto lengths of pipe (5) welded to the bottom of the supports. Crosswise lengths of pipe (6) are welded to end legs for reinforcement to maintain proper spread for steadiness of the supports.

Cold bending of pipes stretches the outer curve, weakening the structure even when no rupture occurs. Heating the whole area of the pipe where a bend is to be made produces a similar result.

A satisfactory method is to heat consecutively, with a torch, local areas in the section to be curved, so that when pressure is applied, each heated area in turn will form a compressed loop (lower photo). This method will produce a bend which does not weaken the structure.

Since legs are attached to I-beam by U-bolts, assembly can quickly be dismantled for compact transportation. —*H. F. Davis, Chief Engineer, Danahy-Faxon Stores, Inc., Buffalo.*



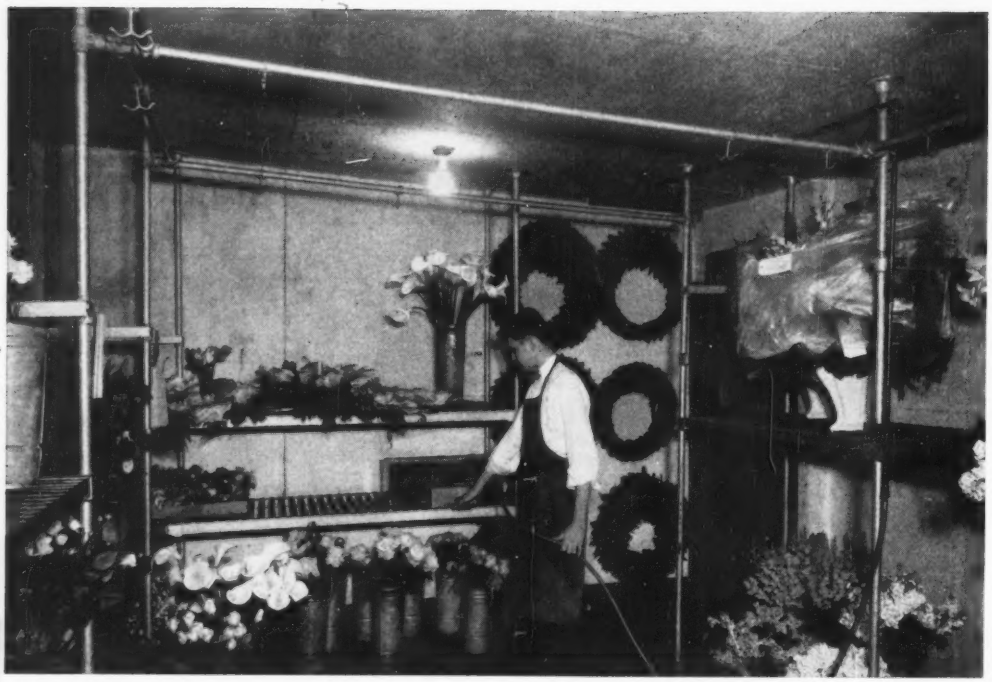
Device Makes Countersinking Uniform

By inserting a specific-size steel washer between drill and material, a series of contersinkings can be kept uniform in size and depth.

Our project was to anchor aluminum-clad plywood to frames by means of screws. And the problem was irregular countersinking, which marred the appearance. Also, when the depth wasn't right screws projected from panel surface and caught worker's clothing and cleaning cloths.

But our use of the washer, with hole of right diameter, solved the difficulty. When countersink tool reaches the edge of the hole in the washer, latter rotates with the drill, preventing further penetration into the panel.

If the face of the washer is sufficiently smoothed, the surface of the material will not be scored or damaged.—*Clifford T. Bower, London, England.*



How old is the insulation in this cold room?

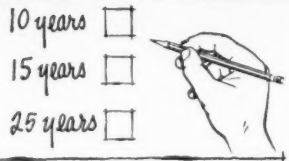
This florist's cooler room certainly doesn't look its age. Despite severe moisture conditions, the corkboard insulation is still completely dry although it was installed in 1929—23 years ago! It needs no repairs, shows no signs of deterioration, and the finish is practically as good as new.

The room itself is built of two layers of Armstrong's Corkboard, each 2" thick. The wall at the right is a free-standing corkboard partition of the same thickness. Surfaces are finished with portland cement plaster and scored according to standard specifications.

In continuous service for all these 23 years, the room is still highly efficient, holding temperatures of 48° F. at remarkably low refrigerating costs.

Unusual? Not at all. Our records show that hundreds of installations using Armstrong's Corkboard are still performing at peak efficiency after 20, 30, and even 40 years!

It takes top-quality insulating materials and expert application to give long, trouble-free service like this. That's why it pays to contact Armstrong whenever you're planning any low-temperature work. We can take over the entire job for you—from specifications to application by skilled workmen—to insure a dependable, economical job. For further information, contact your near-by Armstrong office or write Armstrong Cork Company, 2312 Concord St., Lancaster, Pa.



Complete Insulation Contract Service

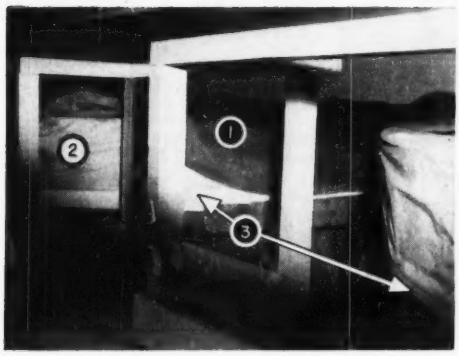
There are many factors that can't be written into an insulation contract, but which can largely determine whether or not the agreement will be entirely satisfactory. They include:

1. Financial responsibility—resources to complete the contract despite any unforeseen events.
2. Integrity—a reputation for quality work and for prompt settlement of any justified complaints.
3. Technical ability — experience, plus technical and research staff to do the job in accordance with best practices.
4. Manpower resources — trained supervisors and workmen able to handle any contract efficiently.
5. Efficiency — ability to deal with problems of accounting, tax provisions, insurance, and workmen's compensation.

You get all these with an Armstrong Contract

ARMSTRONG'S INDUSTRIAL INSULATIONS

For temperatures from 300° below zero to 2800° F.



Way to Bar Gnats From Storage Tanks

Kraft paper and masking tape seal wooden storage tanks sufficiently to prevent fruit gnats, flies and other insects from entering them. We have found that sealing in this manner has two advantages. Not only are insects kept out of tanks, but vinegar odor is kept in, thus reducing insect attraction.

Of course, screens on our storage room windows barred flies and large insects—yet gnats and their like sifted through. A few soon became a swarm. However, the problem was not so much keeping insects out of the storage room as it was keeping them from entering tanks.

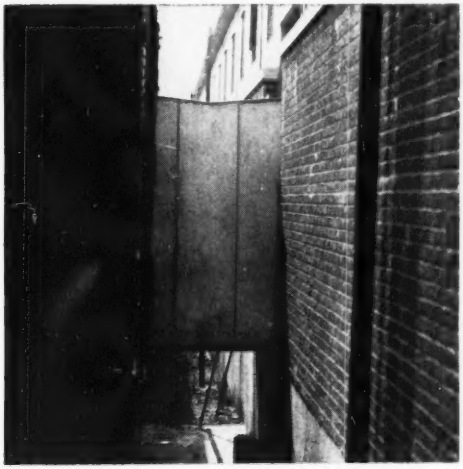
First preventive method we tried was covering tanks with heavy canvas caps—(1) in photo—sides of which extended about 2 ft. down tank sides from the top. Although these hoods hindered the pests, they still found entrance to the tanks. Hoods had one real advantage, however; they kept the hinged wooden tank lids dust free.

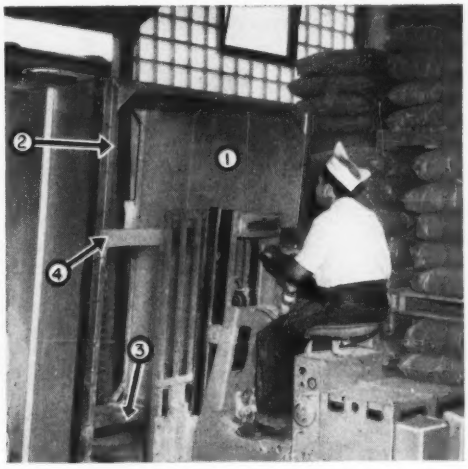
Effective barrier proved to be Kraft wrapping paper (2) applied to the outer 2 ft. of the tank lids and extending a full 2 ft. down from the top of tank walls.

No great skill is required to seal a tank. It is important, however, that the masking tape (3) adhere tightly to the wood at edges of the paper so that no insect passageway remains. The same precaution also applies to taping laps of the paper.

Although canvas hoods alone were ineffectual in withholding gnats, it was found unnecessary to paper-seal the entire lid. Canvas cap gives ample protection over the lid center, so long as the outer 2 ft. are paper-sealed.

This method of sealing tanks not only keeps vinegar gnat-free but also cuts to a very few the insects attracted to the storage room.—*Howard L. Richardson, Supervisor, A. 1. Sauce, Food Div., C. F. Heublein & Bro., Inc., Hartford.*





Covered Dock-Board Keeps Them Dry

Since we adopted lightweight, covered and sided, portable runways between loading dock and railroad cars (see left photo), both workers and products are protected during inclement weather.

This is how protected runways are constructed. First, we attach, to a slightly arched steel plate, sheet iron sides and roof, both reinforced by angle iron strips—(1) in right photo. Length of runway was made sufficient to span the clearance between dock and car, with width ample for the travel of a pallet loaded fork truck.

Roof, high enough for clearance of truck and operator, is sloped slightly downward from each end toward the center. This prevents rain or melted snow from draining either into car or into plant.

While this arrangement assured dry passage to and from rail cars, it did not prevent rain from blowing into the car or plant from around the sides of the metal tunnel. Therefore, provisions were made next for curtaining with canvas the space between passageway and car and plant-door frames. This was done by attaching 2 x 4's to the edges of both passageway openings (2). Into these timbers hooks were screwed, and onto these canvas is attached to close the area between door frames and dockboard canopy.

Putting the assembly in place and transporting it is simplified by inserting a removable pipe (3) or steel rod into an attachment a few inches above the runway floor and near the end which enters the car door. Inserting the forks of a truck under this bar provides a means of lifting and tilting the assembly against the truck. Here it rests on a removable board (4) held by hook-supports on the ends of the sides.

Now, with a satisfactory dock-to-car passageway, pro-

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CONVEYOR and TRANSMISSION

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The FINEST FOOD BELT

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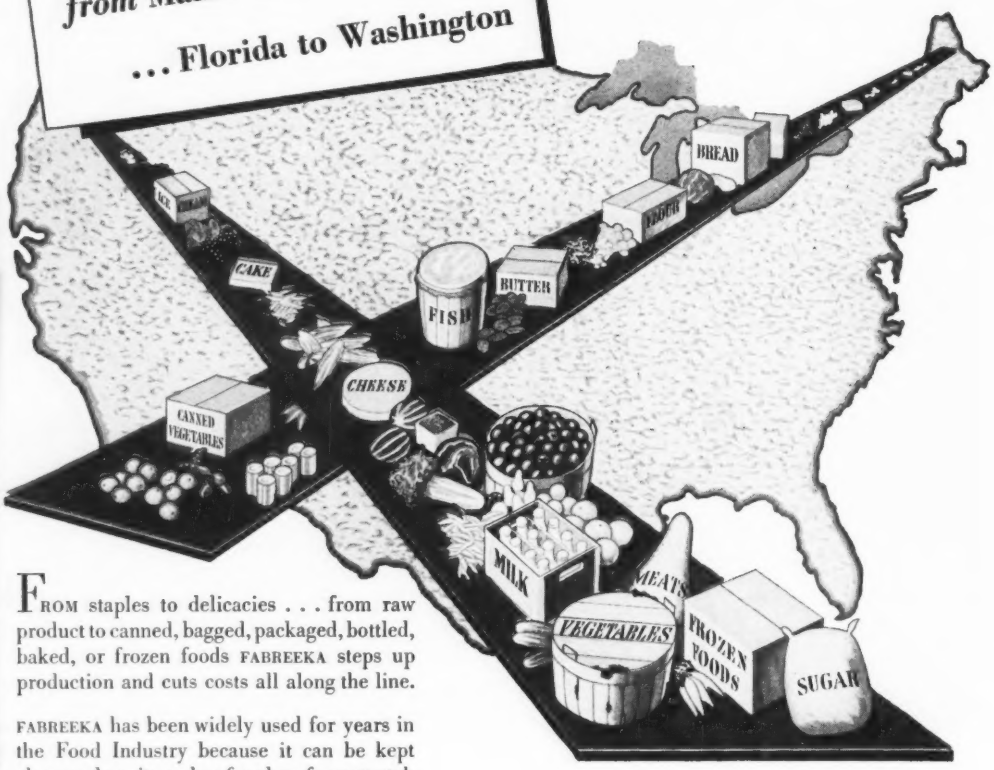


FROM staples to delicacies . . . from raw product to canned, bagged, packaged, bottled, baked, or frozen foods FABREEKA steps up production and cuts costs all along the line.

FABREEKA has been widely used for years in the Food Industry because it can be kept clean and sanitary, has freedom from stretch and shrink, resists extreme heat, cold, water, brine, and chemicals encountered in the industry. Made of specially woven cotton duck and rubber, — FABREEKA Belting is True-tracking, Flexible and has Great Strength and Long Life . . .

You can eliminate costly start-up delays with FABREEKA!

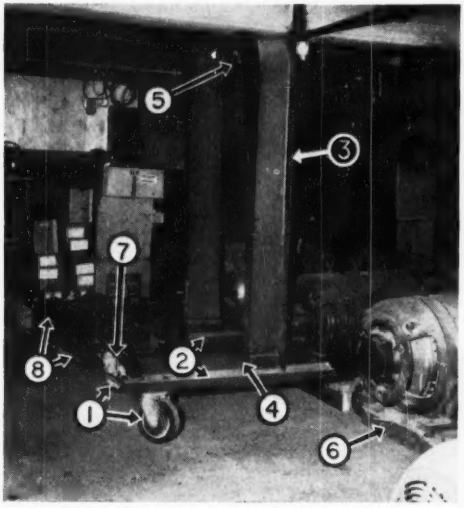
FABREEKA PRODUCTS COMPANY, INC.

222-F Summer Street, Boston 10, Massachusetts

NEW YORK CHICAGO DETROIT SPARTANBURG PHILADELPHIA PITTSBURGH OAKLAND

tected from rain and snow, only one other improvement was needed—comfort for workers in the cars during cold weather. Unit-heaters supplied the solution to this problem. They were located in the plant above loading-dock door and directed so as to supply a blast of warm air through the enclosed passageway and also into the freight car.

Covered dock board is equally protective whether sacks of flour on pallets are transported by truck into plant or whether they are emptied into an air conveying system. In the latter, case, conveyor tube is laid along the covered runway.—*M. Klimas, Plant Engineer, A. Zerega's Sons, Inc., Fair Lawn, N. J.*



Mobile Crane for Motor Handling

Heavy motors can be moved from stand-by storage easily, safely, and speedily to replacement location by means of our specially designed motor-transport crane.

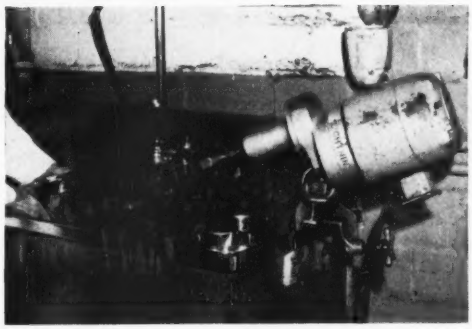
This is how the assembly is fabricated and used:

Large-size casters—(1) in photo—are bolted to each end of two 5-ft lengths of 6 in.-wide channel-irons (2). At the center of the latter, which form the truck bed, a crane (3), made of 8 in. channel and shaped like an inverted U, is reinforced by plate and angle iron (4) and welded. Centered in the top of the crane is a large eye-bolt (5) to which hoist is hooked for lifting motors.

In stand-by storage, motors rest on pallet-like wood platforms (6), spaced apart to permit passageway for the casters of the transport. Since truck bed consists of only two horizontal channels, transport can be rolled between motors until crane is centered with lifting eye-bolt on the motor to be moved.

When in this position, steel straps (7), are slipped over studs on each end of the bed and anchored in place by tightening wing-nuts. This prevents the straddle-type carriage from spreading under the heavy weight of the motor. Pull-rods for towing the truck are likewise detachable, to facilitate the loading or unloading operation.

After motor is hoisted from its storage-room base and secured to vertical channels of the crane, the assembly can be rolled to destination with ease and without danger to the heavy load.—*F. A. Wenske, Assistant Supt. of Maintenance, Eastern States Farmer's Exchange, Buffalo.*

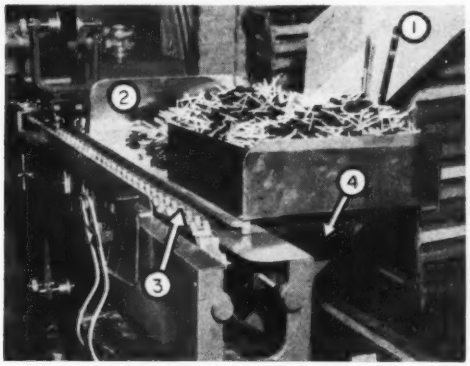


Powered Can Cleaner Improvised

By mounting three wooden-handled brushes on the shaft of a "Lightnin" mixer, we fabricated a very efficient can and utensil cleaner. Assembly has the advantage of being portable and adjustable to the best angle for washing.

Selected were brushes of a round type mounted on wood spindles—such as are used in dairy cleaning operations. Three of these were capped with metal tubes which were then attached to a face plate. Latter is fitted to the shortened shaft of the mixer.

Cans to be cleaned are partially filled with water, then tilted and lifted so that the rotating brushes scrub all the areas inside the container.—*Robt. Korn, Plant Engineer, Henry & Henry Inc., Buffalo.*



Sanitary Recovery of Candy Dust

Inserting a screen in the bottom of an accumulator table for hard candy on sticks, at S. F. Whitman & Sons, Inc., Philadelphia, and installing a sliding metal tray beneath, has confined candy fragments and sugary dust, and at the same time provided a means of collecting recoverable material in sanitary condition.

Formerly, hard candy balls on paper sticks were fed in by a chute–(1) in photo–from belt conveyor, and collected on stainless table (2) at wrapping machine feed station.

Chipped-off fragments and candy dust are the result of handling this kind of confection. As this recoverable material accumulated it interfered with hand loading of wrapping-machine feed-line (3), and occasionally spilled over the conveyor and onto floor.

Now, with a screen in the bottom of the table and a removable catch-tray (4) beneath, area can be kept clean, and usable material recovered in sanitary form.—*FE Staff.*

NOW, FOR THE **FOOD** AND **DRUG** FIELDS . . .

a brand-new Carboloy created-metal equipment parts against corrosion,

GET THESE **FREE**
CHROME CARBIDE
DATA SHEETS

Now, at no cost to you, well-illustrated Technical Bulletin WR-104, containing data sheets that include: physical properties, characteristics of Grade 608 Chrome Carbide, many test results, chemical comparisons between both chrome carbide and steel, plus machining and brazing methods, application histories, etc. Send coupon, opposite page, for your free copy.

See how chrome carbide

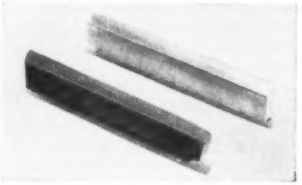
✓ **WITHSTANDS GREAT HEAT**

After exposure in air at 1850° F. for 24 hours, Grade 608 Chrome Carbide (center) is hardly discolored, while 18-8 stainless steel (left), tungsten carbide (right) are all but disintegrated. Bars originally were same size, shape.

✓ **RESISTS CORSROSIVE ACIDS AND ALKALIS**

With sulphuric acid as the corrosive agent, for example, chrome carbide parts, such as those above, show about 30 times the resistance of 18-8 stainless steel and 3 times the resistance of tungsten carbide.

✓ **STOPS ABRASIVE WEAR COMBINED WITH CORROSION OR EROSION**



Centrifuge blades, after 6 weeks of operation under severe conditions. Tungsten blade (left) shows wear. Chrome carbide blade (right) successfully resists the combination of abrasion, corrosion and erosion.

to wearproof your abrasion, erosion.

It's cemented chrome carbide—not a cutting-tool material, but a new wear-proofing created-metal for use wherever heat, oxidation, acids, alkalis and abrasive wear must be effectively combatted.

HERE IS a new and outstanding wearproofing metal —Carboloy Grade 608 Cemented Chrome Carbide — the first member of an entirely new family of metallic carbides.

Grade 608 Chrome Carbide opens wide the door to longer part life, and offers you such resulting benefits as lower replacement and maintenance costs, higher all-round performance.

Here's why: It features extremely high resistance to corrosion or erosion, combined with excellent abrasion resistance. It's harder than steel, virtually unaffected by heat or high-temperature oxidation. Far surpasses stainless steels in many applications for resisting acids and alkalis, too.

In addition, it is light in weight, completely non-magnetic and has a coefficient of thermal expansion about the same as that of steel. It is machineable and hard as tungsten carbide, stable and strong.

Soon, production quantities of Grade 608 Chrome Carbide will be available. In the meantime, if you're a chemist, designer, metallurgist or engineer, you'll want all the facts on this new metal. Send coupon below for free data sheets, described on opposite page.

OFFERS YOU LONGER, TROUBLE-FREE PART LIFE IN

SPRAY NOZZLES

Tests show that chrome carbide nozzles can cut down clogging by eliminating corrosion; can improve all-round spray performance.

STEAM VALVES

Balls and seats of chrome carbide are light for easier operation, yet better able to resist scratching, pitting, abrasion.

ORIFICES FOR HOT GASES

Here, chrome carbide can resist oxidation and temperatures higher than those which would disintegrate steels and tungsten carbides.

PLUS THESE OTHER CHROME CARBIDE APPLICATIONS NOW BEING TESTED

- Sheer blades for molten glass
- Core pins for baking ceramic parts
- Fishing rod guides
- Centrifuge nozzles, separating equipment
- Bearings where corrosives are present
- Textile guides
- Nozzles and valves: soaps, fats, oils, foods, chemicals, pharmaceuticals, petroleum products, fruit juices
- Punches for movie film
- Valve and core pins, die casting, and many other applications.

9-PIECE TRY-IT-YOURSELF KIT, $10.75

Test Grade 608 Chrome Carbide yourself. Kit includes: 3 bars ¼" sq. x 2"; 2 bars ¼" sq. x 1"; 3 bushings, 5/16" I.D.; 1 rod, ⅛" dia. x 1" long . . . adequate samples for a wide range of tests. Bulletin WR-104 included.

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Detroit 32, Michigan

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☐ **Please send me free Technical Bulletin WR-104 only.**

☐ Please send me ( ) sample Try-It-Yourself Kits of Grade 608 Chrome Carbide at $10.75 each. (Bulletin WR-104 included.) Enclosed is ☐ Check ☐ Money Order ☐ Purchase Order for $_____.

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BATTERY

GIVES you more...SAVES you more

It gives you more of everything that adds up to top performance, long battery life . . . saves you more through low over-all costs. Outstanding new features, including the polyethylene insulating tube sealer, *more than ever before*, make Exide-Ironclad YOUR BEST POWER BUY . . . AT ANY PRICE.

HERE'S WHAT YOU GET

Rapid, accurate handling . . .
Uniform rate of handling . . .
High availability . . . Low operating costs . . .
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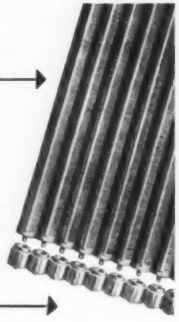
High maneuverability . . . Safe handling

AND HERE'S WHY



IMPROVED POSITIVE PLATE CONSTRUCTION. The long-life grids now contain SILVIUM—an alloy of silver, lead and other components—which make them highly corrosion-resistant.

NEW POLYETHYLENE INSULATING TUBE SEALER of acid-proof, non-corroding plastic. It fits snugly into slotted tubes of positive plates, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus more active material remains available, and the high battery capacity is maintained for a longer working life.

PLUS THESE EXTRAS

IMPROVED NEGATIVE PLATES for higher electrical efficiency.

NEW SEALING COMPOUND provides permanent seal between jar and cover.

SEAMLESS SHOCK-PROOF JAR, of high quality rubber, combines tensile strength and elongation for long-life and heavy-duty service.

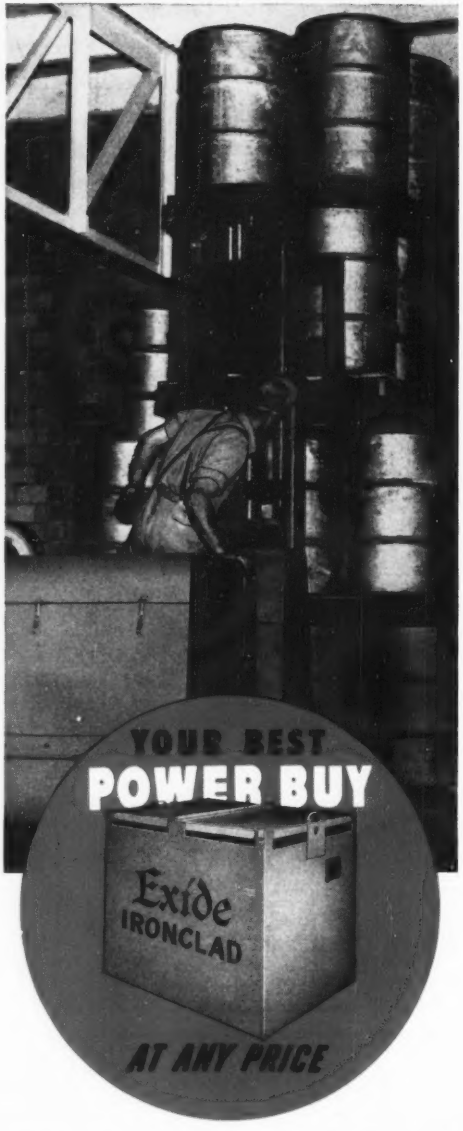
NEW UNBREAKABLE PLASTIC VENT PLUGS of polyethylene.

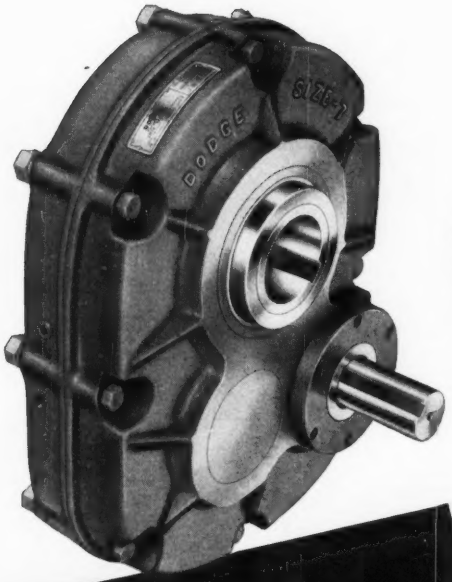
TYPES, SIZES AND CAPACITIES for all kinds and makes of battery-electric trucks—hand and rider.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

1888
DEPENDABLE BATTERIES FOR 64 YEARS
1952

"EXIDE-IRONCLAD" and "SILVIUM" *Reg. T.M. U.S. Pat. Off.*





A NEW SIZE!

43 H.P.

DODGE TORQUE-ARM

The Speed Reducer that saves you real money!

Here it is—the big size that enthusiastic Torque-Arm users have been asking for! Engineered for the same dependable performance and same economy that have made Dodge Torque-Arm Speed Reducers a nation-wide sensation.

- The new "big brother" of the famous Torque-Arm family. Double reduction. 43 hp capacity. Output speeds from 12 to 110 rpm.
- Rugged. Dependable. *Economical.* No special engineering required. No foundation to provide. No flexible couplings. No "lining up" difficulties. No expensive installation.
- Stock TAPER-LOCK sheaves prescribed for each job provide desired speeds. Applications to other machines is practical and easy.
- Unit is driven through any V-belt drive. A torque arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.
- Backstop available from stock when required. Easily installed. Sealed and lubricated inside reducer housing.
- Dodge Tri-Matic Overload Release, which provides positive protection for driven machines both mechanically and electrically, is available from stock.
- Dodge Torque-Arm Speed Reducers are built in two series—Single and Double Reduction. Eleven sizes in all, with capacities from 1 to 43 hp and output speeds from 13 to 333 rpm. All available from distributors' stocks.
- WRITE for special Torque-Arm bulletin.

DODGE MANUFACTURING CORPORATION
2800 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.

SEALED-LIFE V-BELTS AND TAPER-LOCK SHEAVES

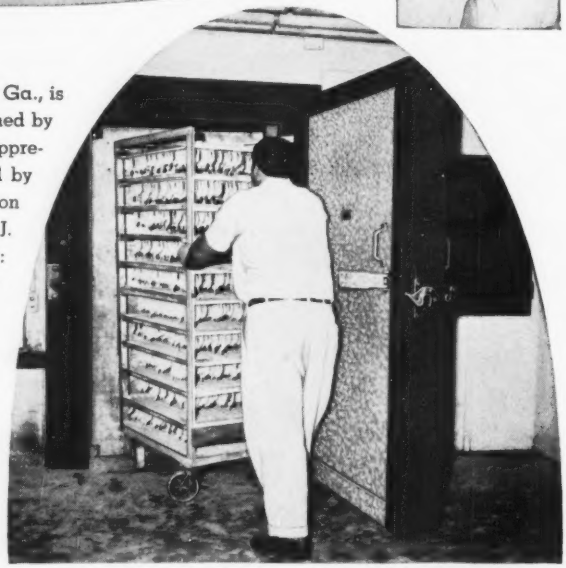
DODGE-TIMKEN PILLOW BLOCKS

SOLID STEEL CONVEYOR PULLEYS

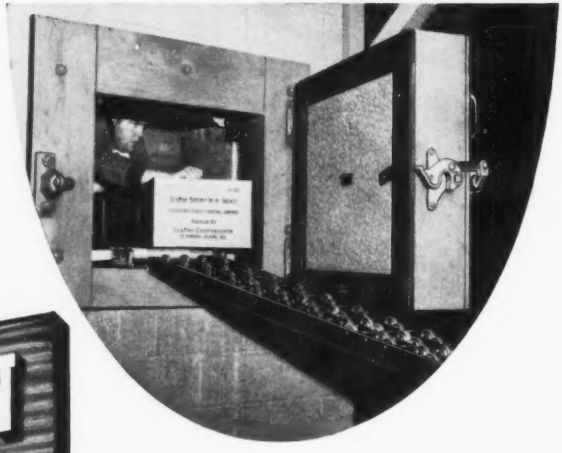
"JAMISON doors were recommended by our engineers. They have proved worthy of the recommendation by their efficiency."

J. ROY DUGGAN, General Manager, SeaPak Corp.

The SeaPak Corporation of St. Simon's Island, Ga., is famous for its packaged shrimp—a fame earned by its advanced processing methods and a keen appreciation that freshness can only be maintained by efficient refrigeration. When asked why Jamison Cold Storage Doors were chosen for his plant, J. Roy Duggan, General Manager of SeaPak, said: *"They were recommended by our engineers and have proved worthy of the recommendation by their efficiency."* For full information on Jamison doors request Catalog, Sec. 1, Jamison Cold Storage Door Company, Hagerstown, Md., U.S.A.



SUPER FREEZER DOOR provides a tight seal for this 60° below flash freezing room. Vestibule Door helps save refrigeration during movement of material.

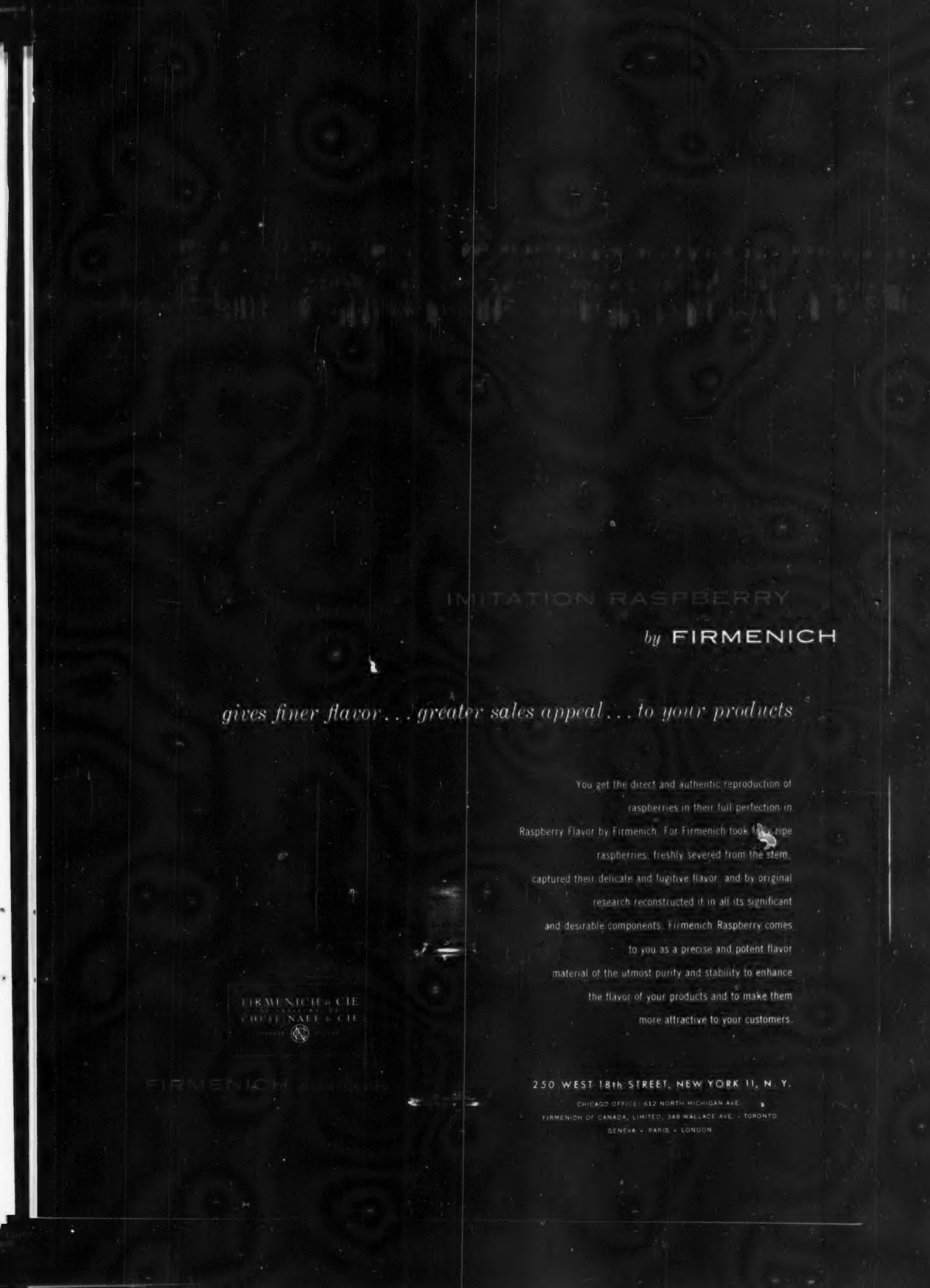


REACH-IN SUPER FREEZER DOOR SPEEDS HANDLING by use of conveyors. Small door size plus self-closing inside batten doors keep refrigeration losses to a minimum when storing or removing cartons.

JAMISON

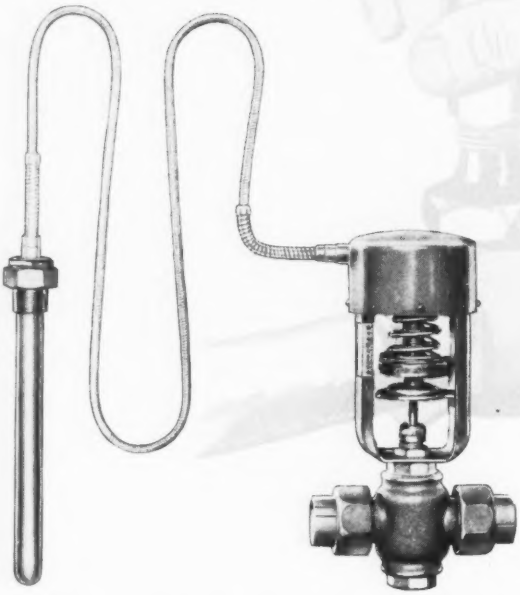
HAGERSTOWN, MARYLAND, U. S. A.

The Leader For Over 50 Years


IMITATION RASPBERRY
by FIRMENICH
gives finer flavor . . . greater sales appeal . . . to your products
You get the direct and authentic reproduction of raspberries in their full perfection in Raspberry Flavor by Firmenich. For Firmenich took fully ripe raspberries, freshly severed from the stem, captured their delicate and fugitive flavor, and by original research reconstructed it in all its significant and desirable components. Firmenich Raspberry comes to you as a precise and potent flavor material of the utmost purity and stability to enhance the flavor of your products and to make them more attractive to your customers.
250 WEST 18th STREET, NEW YORK 11, N. Y.
CHICAGO OFFICE: 612 NORTH MICHIGAN AVE.
FIRMENICH OF CANADA, LIMITED, 348 WALLACE AVE. • TORONTO
GENEVA • PARIS • LONDON

SYLPHON CONTROLS FOR DEPENDABILITY

BETTER THAN ANY HAND



...for efficient, economical process control

● An automatic Sylphon Control can do a better job, any time, than hand-operated valves or "guess methods" do at governing temperatures. For Sylphon Controls maintain temperature that assures *uniform* processing conditions . . . *constant* product quality. They help reduce spoilage, wasteful overheating . . . save manpower and manhours. They do their jobs dependably—day in and day out.

Sylphon Temperature Regulator No. 999, pictured here, is one of the Sylphon line. Its outstanding features include stainless steel frame for minimum heat conduction from valve to regulator head . . . large size 2-ply Sylphon bellows for added power . . . less height and weight than other types. Self-operating—requires no auxiliary power source. Particularly suited for storage water heaters, metal plating tanks, bottle washers, treaters, slashers, etc.

Find out about the advantages of No. 999, or of other Sylphon Regulators, for maintaining *constant* processing control temperature. Write for Catalog XG-A.

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON DIVISION

FIRST WITH BELLOWS

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

The Modern Food Container!

. . . is finding wide success as an individual coffee bag due to its many fine features

VISKON IS ECONOMICAL!
Gives top performance where a "breather" type package is required—at little cost.

VISKON IS HEAT-SEALABLE!
Generally, VISKON seals at between 350° and 500°F, corresponding with dwell time and jaw pressure.

VISKON IS STRONG, DURABLE!
Holds its shape, yet is soft and flexible. Has exceptionally high *wet* strength.

VISKON IS TASTELESS!
It's non-toxic, completely sanitary for use as a food container. Lint-free and non-raveling.

VISKON® nonwoven fabrics
—another product to fit today's needs by
THE VISKING CORPORATION
NORTH LITTLE ROCK, ARKANSAS

VISKON nonwoven fabrics offer a new product for packaging where porosity, product breathing, absorption, diffusion, infusion and *wet strength* are needed. **VISKON** opens up new and better ways to present your product to the consumer. Already **VISKON** has proven a success in coffee packaging. **VISKON** is suitable for packaging of tea, dried food, spices, etc.

VISKON is made of rayon and cotton fibers bonded with cellulose . . . can be safely used in connection with foods. It is non-toxic, tasteless, odor-free, lintless and completely sanitary.

VISKON is available in mill rolls, tapes or sheets—in a wide variety of weights and grades of either cotton or rayon fabric. Investigate **VISKON** today for your food packaging problems. Mail handy coupon below for additional information and samples . . . do it today!

Please send more information about VISKON for use as a product container.

THE VISKING CORPORATION, Dept. FE
Box 72, North Little Rock, Arkansas

Name .....
Position .....
Company .....
Address .....
City ..... *Zone* ..... *State* .....

For more information, use post card on last page.

The Protection of Century Type TEFC* Motors Keeps Production Rolling

T E F C

Your Maintenance Man.. who must keep your Production Turning, knows how to evaluate the inside of the Motor. Ask him about these Century Construction features.

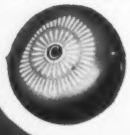
Century type TEFC protected type motors are very popular in the chemical and food processing industries for resisting rust and corrosive fumes. They are widely used in the metal working industries to protect the vital parts against abrasive dust or gritty oil fog.

Specify Century motors on the motorized equipment you purchase, or call a Century branch office or a Century distributor when you purchase motors. Century manufactures a complete line from ½ to 400 H. P.

- Vital parts of motor protected — sealed-in inner frame.
- Reverse direction of motor without changing fan — Fan runs in either direction.

- Uniform ventilation — surrounding outside of inner frame.
- Smooth straight-through ventilating passages.
- Winding electrically insulated 6 different ways.

- Uniform rotor winding — high pressure cast aluminum.
- Ball bearing housing keeps grease "in"—dirt "out"—lubricated for several years' normal service, with grease plugs when you want to lubricate bearings.



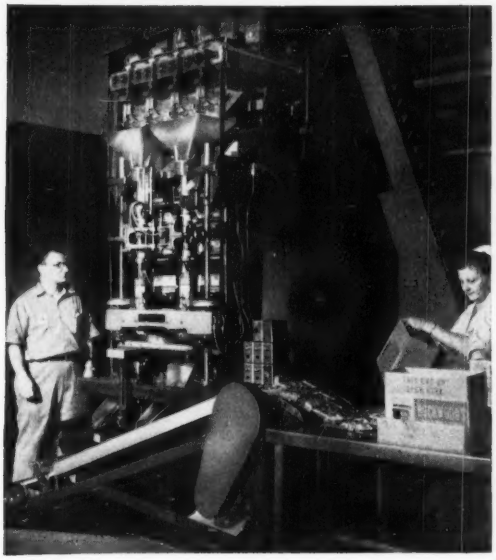
- Easy to remove fan guard for inspection—2 screws hold steel fan guard in place.

Century C MOTORS

CENTURY ELECTRIC COMPANY
1806 Pine Street · St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

ROCKWOOD CHOCOLATE

USES THE NEW NET WEIGHT SCALE FEED



by TRANSWRAP *for*

- **A complete packaging plant in one machine.**
- **Accuracy of feed**—exceeds all other feeding methods at full production.
- **Lower costs**—least labor cost per unit.
- **Attractive packages** — from printed roll stock.
- **New markets for quality chocolate**—in the low price packaged candy field.

Rockwood & Co., makers of quality chocolate, have selected TRANSWRAP's new Net Weight Scale Feed with the Model "B" TRANSWRAP as the most practical method of producing low cost packages of their products for the five to twenty-five cent market. The TRANSWRAP "complete packaging plant in one machine" is the only equipment of its type in the field. Rockwood Chocolate, with this modern installation, now offers their distinctive "flavored chocolate" packages to meet every popular price range.

The new Net Weight Scale by TRANSWRAP can give YOU a better, faster, more accurate production if you merchandise gum or wrapped candy, nuts, crackers and any items sold by weight. Contact TRANSWRAP or your local agent TODAY.

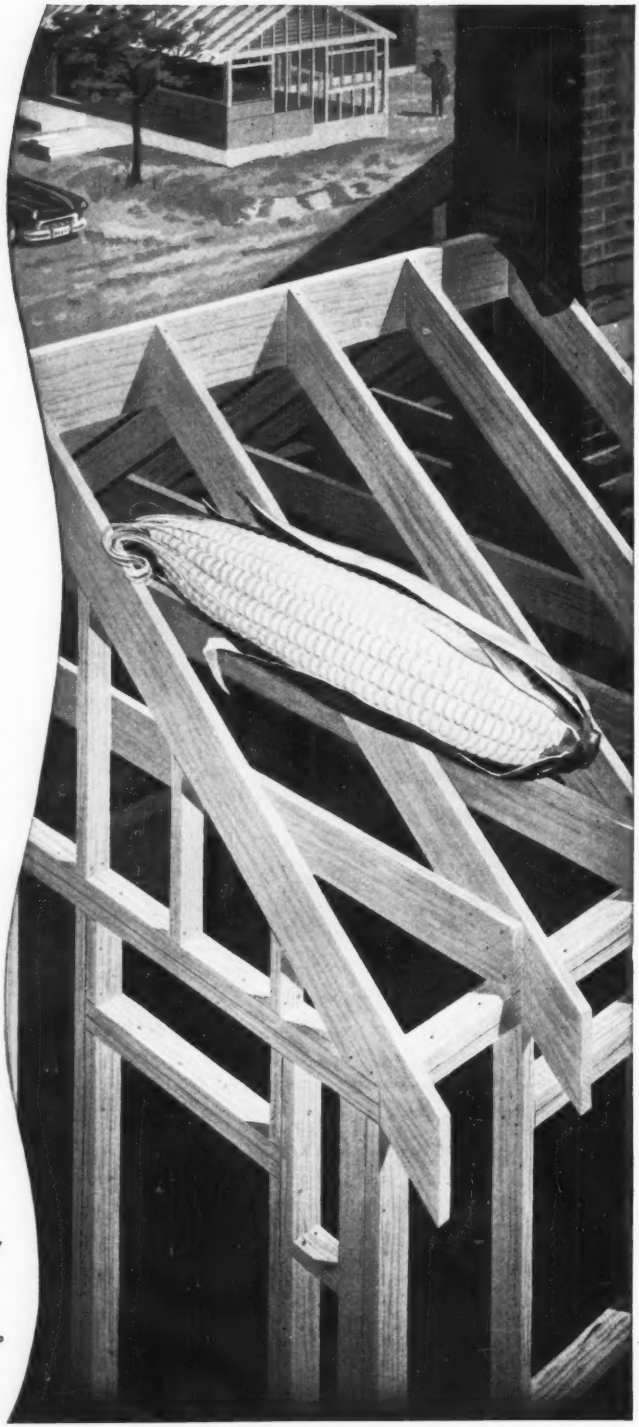
SEE THIS SCALE IN OPERATION AT THE '53 PACKAGING SHOW.

TRANSPARENT-WRAP MACHINE CORPORATION
ROUTE 17 & HENRY STREET
HASBROUCK HEIGHTS, NEW JERSEY, U.S.A.

TRANSWRAP

 For more information, use post card on last page.

What's corn doing up in the rafters?



Basic research in corn helped put it up there . . . in the form of fibre glass insulation.

Certain types of dextrines are needed to produce the glass fibre. These particular dextrines are developed by research in corn. Corn fills a myriad of industrial needs . . . our continuing basic research in corn serves all American industry . . . serves you.

Corn products in food

In the food field highest quality dextrose, regular and high-conversion corn syrups and superior starches are recommended ingredients for many processing formulas. New techniques involving the use of corn products are being developed as part of a continuing research program at Corn Products Refining Company.

If you have a production problem why not check with Corn Products? A complete line of corn products for every purpose is available. Technical service is yours . . . no obligation, of course.

CORN PRODUCTS REFINING COMPANY
17 Battery Place, New York 4, N. Y.

Manufacturers of

CERELOSE® brand dextrose • **PURITOSE®** brand corn syrup • **GLOBE®** brand corn syrup
BUFFALO® brand starch • **HUDSON RIVER®** brand starch

"BUILT TO THE SAME SPECIFICATION STANDARDS – I THOUGHT ALL STEEL VALVES WERE ALIKE AS TWO PEAS"

OIC BUILDS FROM THAT POINT UP

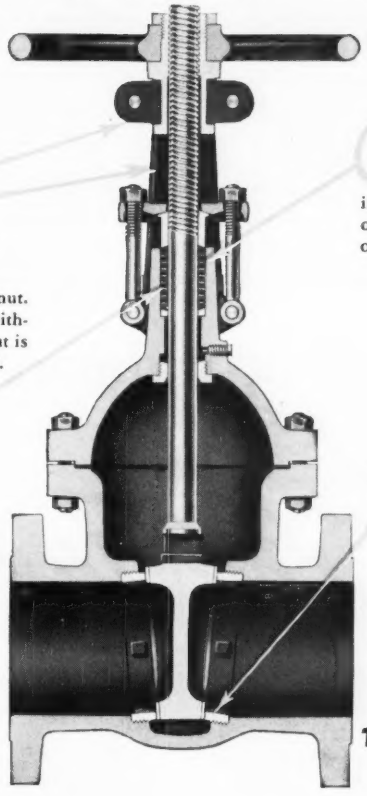
LOOK AT THESE FOUR FEATURES:

1 2–PIECE YOKE DESIGN

simplifies replacement of yoke nut. Permits replacement of yoke nut without shutting down the line. Yoke nut is OIC Alloy 40; non-galling material.

3 OIC'S SEAL–EVER PACKING

(exclusive with OIC) lasts 10 to 15 times longer than ordinary packing. It stops pitting and corrosion of stems.



2 STUFFING BOXES

have greater depth than is specified, permitting the use of 7 to 9 rings of packing, with either wiper rings or condensing chamber below.

4 SEAT RINGS

are end-seated and are subjected only to compression forces when valve is closed; no loosening of seat rings with repeated opening and closing of the valve. No open spaces to cause turbulence, accumulate dirt and hasten corrosion.

THE BEST STEEL VALVE YOU CAN BUY

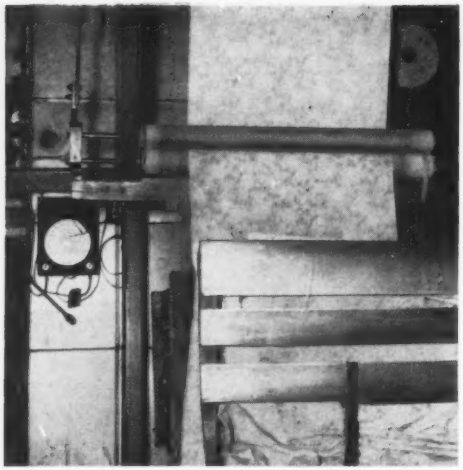
This combination involving yoke design, stuffing boxes, packing and seat rings is evidence of OIC's desire to build *beyond* minimum specifications.

THE OHIO INJECTOR COMPANY, WADSWORTH, OHIO

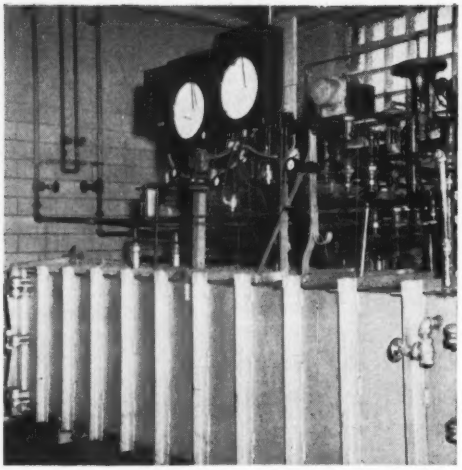
OIC FOUNDED 1883

VALVES

FORGED AND CAST STEEL · IRON · BRONZE



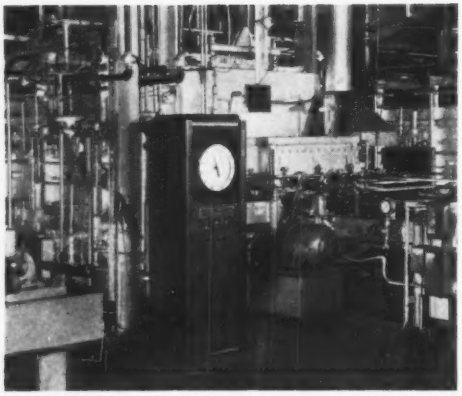
$30,000 SAVING IN ONE YEAR *was effected in this textile finishing mill . . . with the help of the Brown thermometer controlling the temperature of the print dryer. Controlled condition drying eliminated jagged fabric rips which had resulted in absolute waste.*



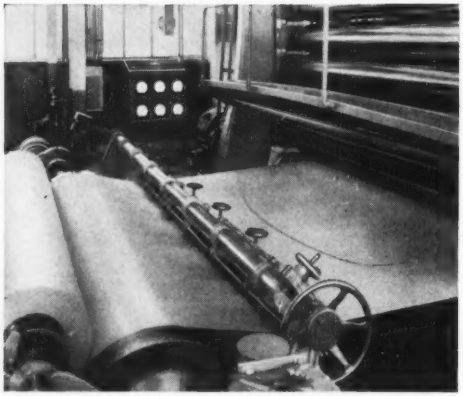
DUAL USE OF RETORT, *thanks to custom-built control system, permits using same equipment for boiling meats that is used for pressure-cooking glass-packed products. Cook time has been cut; glass breakage eliminated; labor saved; and production increased for both jobs.*

For all of industry... *especially*

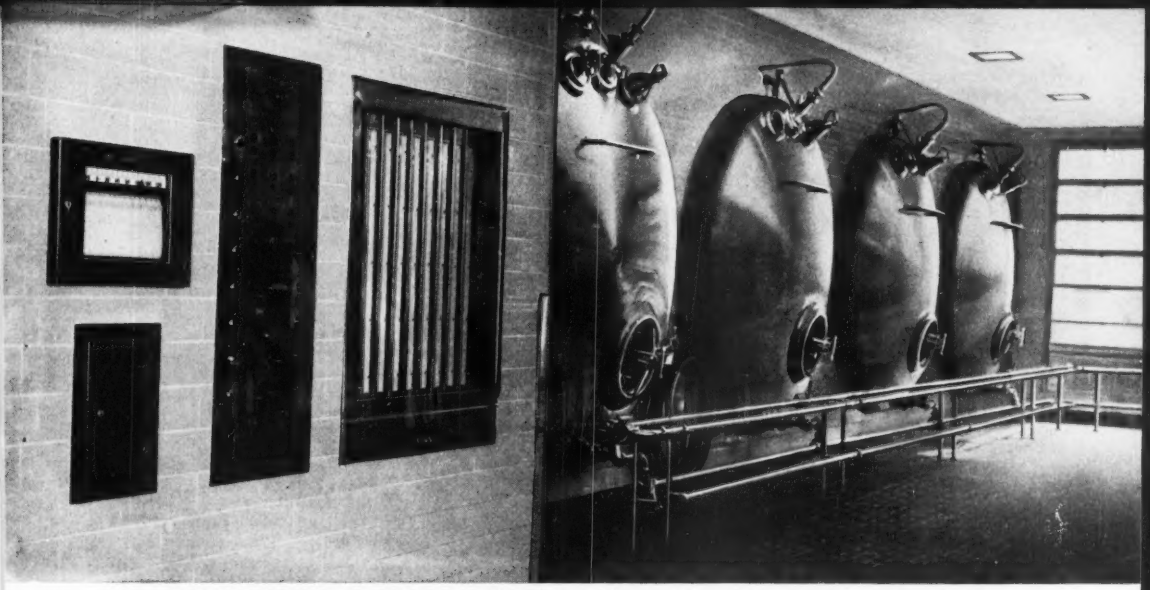
Instruments



PREVENTING COSTLY ERRORS *in heat treatment is the job of this Surface Combustion dew point recorder which utilizes an* **ElectroniK** *instrument. Carburizing, nitriding, dry cyaniding, and carbon restoration are affected by the dew point of gases employed, and have a profound effect upon metallurgical results.*



ALL BTU'S ACCOUNTED FOR . . . *in this machine room. Brown integrating flow recorders keep close track of every pound of steam . . . give speedy indication of excessive steam consumption. A variety of instruments hold operating costs at a minimum throughout pulp and paper mills.*



STORAGE TEMPERATURES CENTRALIZED *on this multi-point ElectroniK Recorder are easy for the operator to check at any time in a big eastern dairy's milk storage room. Use of modern thermocouple instruments has brought a large saving in milk tank clean-up time—and has reduced maintenance and repair bills.*

for the food industry

reduce costs

WITH labor and raw material costs at all-time highs, progressive food processing plants are turning to modern instrumentation as a means of trimming production and maintenance expenses . . . and boosting quality at the same time. They find that automatic measurement and control give these important savings:

- *More efficient utilization of labor and equipment*
- *Reduction of product loss*
- *Non-stop operation at peak capacity*

An eastern dairy, for example, has simplified supervision and effected savings in clean-up time through centralized recording of storage temperatures. A large food packing plant uses a custom-built control system which permits the same retort to be used for boiling meats and for pressure cooking glass-packed products. Not only does the processing equipment perform this double duty with full efficiency on both types of product, but glass breakage has been eliminated and overall labor costs reduced substantially.

These examples can be multiplied many times over by the experience of plants where labor, maintenance and material costs have been reduced . . . through the application of modern instrumentation.

Let Honeywell help you solve your plant's cost-cutting problems. Call your local Honeywell engineering representative today . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4502 Wayne Ave., Philadelphia 44, Penna.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS

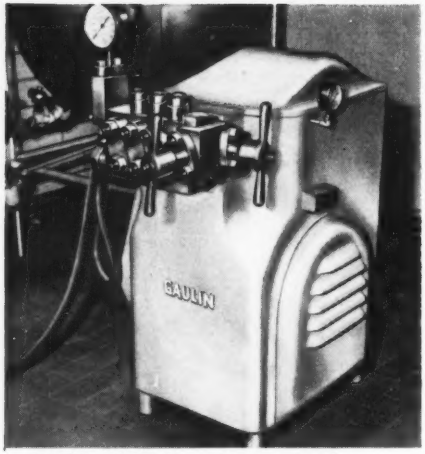
First in Controls

● *Important Reference Data*

Write for copy of new brochure, "Tomorrow Is Today" . . . and request Data Sheets for Specific Food Industry applications.

It's a Show-Off Here-

because it's emulsified here ... with a GAULIN HOMOGENIZER



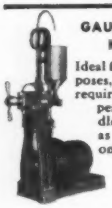
WAGNER BAKING CO. installation in Brooklyn, N. Y. showing 125 GPH Gaulin Homogenizer used in making Mrs. Wagner's famous pie topping.

Secret of toppings that taste better ... drape better ... look better ... sell better is a Gaulin Homogenizer. A Gaulin breaks fat particles *uniformly finer* to unlock new flavor ... then disperses them so evenly they whip faster, last longer ... won't separate or bleed.

Gaulin's accurate viscosity control strikes a happier economical medium, too, between stiffness for drape ... and fluffiness for volume.

More proof that Gaulin Homogenizers make better emulsions and dispersions FASTER, MORE ECONOMICALLY.

Why not investigate for your product, today. Complete testing facilities and recommendations are yours — without obligation.



GAULIN PILOT PLANT HOMOGENIZER

Ideal for experimental purposes, operation or process requiring up to 25 gallons per hour capacity. Handles quantities as small as one pint. Available on low rental basis.

GAULIN TWO-STAGE COLLOID MILL

Stator is jacketed for cooling or heating. Gap setting adjustable for .001" to .045". Only 45 seconds clean-up required in changing colors. 12" head room. 12" x 17" floor area.

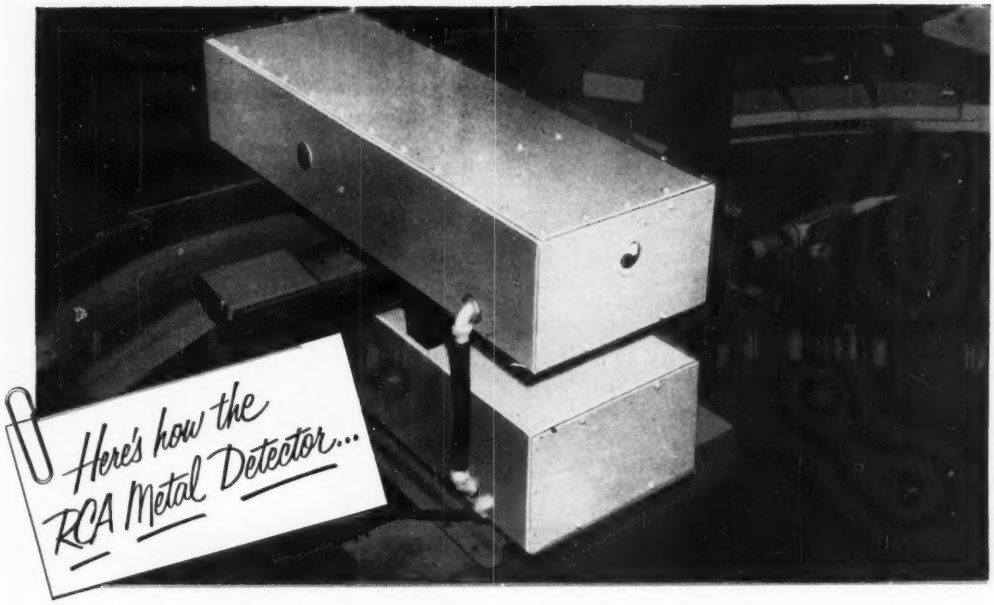
Gaulin

Manton Gaulin

MANUFACTURING COMPANY, INC.

63 GARDEN STREET, EVERETT 49, MASS.

World's largest manufacturer of Homogenizers, Triplex Stainless-Steel High Pressure Pumps, and Colloid Mills



Searches your product for stray metal

Throughout the nation, in large and small plants, the RCA Metal Detector is at work searching through raw ingredients and packaged goods—protecting important product names from complaints of stray metal.

Through the use of radio waves, the RCA Metal Detector searches "clear through" your product. It can be regulated to find pieces of metal as small as 0.039 inches in diameter. It can find the important offenders such as cotter pins, hairpins, burrs from machinery, *no matter how deeply imbedded.* It spots any kind of metal—magnetic or non-magnetic—at conveyor speeds as high as 1000 feet per minute.

The compact RCA Metal Detector fits easily into any conveyor system . . . belt, chute, duct, vibrator, inclined plane, automatic hopper . . . provides inspection with practically no installation problems. In most cases it goes in without any shut-down of conveyor lines. Complete maintenance is available from nation-wide RCA Service Co.

Your RCA Metal Detector can be arranged (1) to reject contaminated packages from your conveyor, (2) to sound a signal for manual rejection or (3) to stop conveyor lines when it spots the presence of tramp metal.

RCA Metal Detectors are at work now, protecting the products of the nation's leading food and candy manufacturers.

DON'T DELAY—MAIL COUPON NOW

RCA

INDUSTRIAL EQUIPMENT

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

Radio Corporation of America
Dept. 198L, Building 15-7
Camden, N. J.

Please send me information on the RCA Metal Detector.

Name_____

Title_____

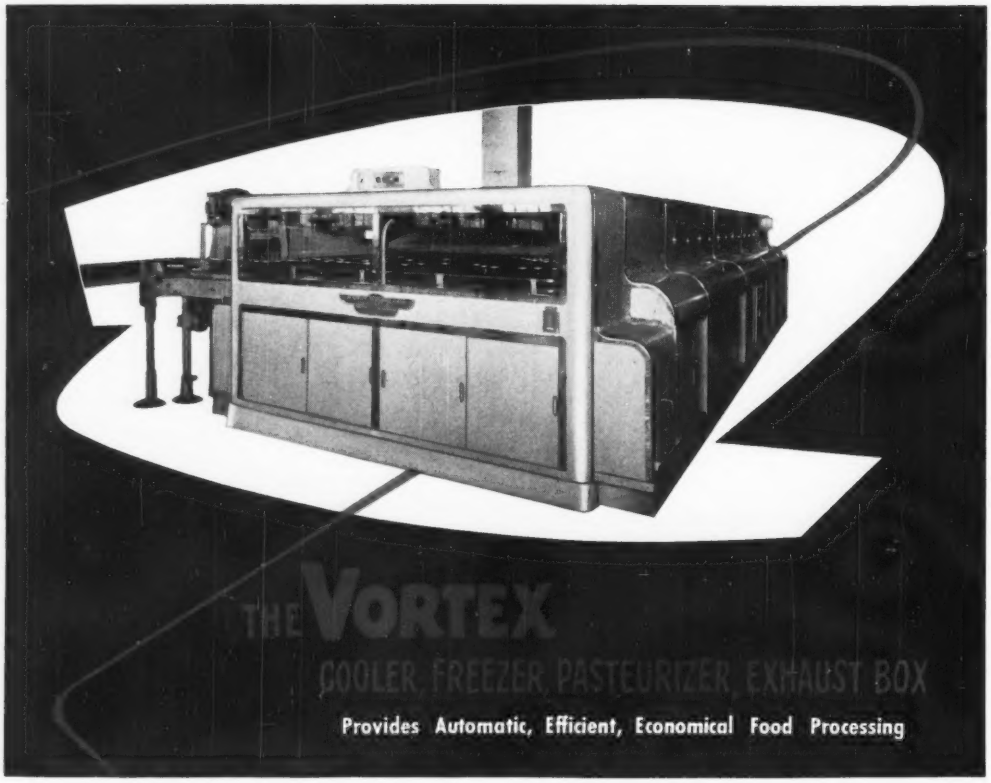
Company_____

Address_____

City_____ Zone____ State_____

☐ Please have a sales engineer call on me.

For more information, use post card on last page.



The famous Barry-Wehmiller "Vortex" machine is being successfully used by more and more food processors in a wide variety of applications. Whether *your* processing requirements include cooling, freezing, pasteurizing, or exhausting, you'll find the Vortex perfectly adapted to glass or metal for food or beverage containers.

Operation of the "Vortex" is entirely automatic and continuous. Accurate dial control of speed assures correct processing time. Compact design conserves valuable floor space.

Engineering advantages include the patented "walking beam" conveyor which moves containers through processing zones, yet the conveyor itself remains at the same temperature throughout the processing operation. This eliminates the usual cost of heating, cooling or reheating the conveyor system. Hydraulic drive eliminates many gears and cam movements. Power requirements are low.

For years of the most efficient, economical processing, specify the "Vortex" for your plant. Write for complete data today.

THE SUN NEVER SETS ON BW BOTTLE CLEANERS PASTEURIZERS & PROCESSORS

BARRY-WEHMILLER MACHINERY CO.

4660 WEST FLORISSANT AVENUE · ST. LOUIS 15, MO.

IN GREAT BRITAIN BW BARRY-WEHMILLER MACHINERY CO. LTD. BROOKLANDS ROAD WEYBRIDGE SURREY ENGLAND

YOU FORTIFY SALES WHEN YOU

Fortify Foods WITH

Pfizer Vitamins

• You give your food products added appeal that builds sales when you fortify them with essential vitamins. That's because today's homemakers are becoming increasingly vitamin conscious. Daily they shop for the foods that bring the best nutritional values to their families...vitamin fortified foods.

Pfizer, pioneers and leading manufacturers of vitamins for more than fifteen years, has accumulated a vast store of experience in food fortification. If you are considering fortifying one or more of your food products, Pfizer will be happy to place this wealth of information at your disposal. Developmental studies, shelf-life tests and other aspects of food fortification can be made simpler by calling Pfizer.

Pfizer Vitamins for Food Fortification

Vitamin A—Crystalets*— A dry, free-flowing form of pure Vitamin A Acetate. Extremely stable. Eliminate the need for excessive overages.

Vitamin A Palmitate—For food processors requiring a form easily dispersible in water or soluble in oil. A light-colored liquid vitamin A of high purity and superior stability.

The Vitamin B Family—As a pioneer in enrichment concentrates for flour and enrichment wafers for bread, Pfizer has long recognized the need for fortifying other foods with B vitamins. Available for fortification are: Thiamine, Riboflavin, Niacin and Vitamin B_{12}, the newest member of the B Complex group.

Vitamin C—Ascorbic Acid—In addition to being a nutritional essential, it is also an effective antioxidant in many foods and beverages.

Write for your copy of the booklet "Pfizer Products for Food Fortification" today!

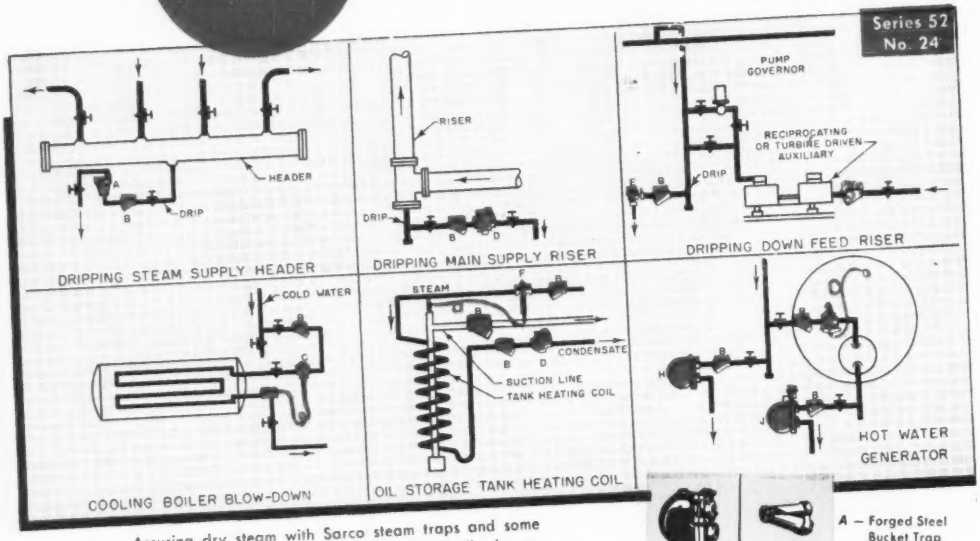
*TRADE MARK

CHAS. PFIZER & CO., INC.
630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.

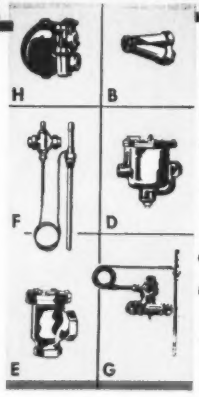
Pioneers and Leading Manufacturers of Vitamins

PFIZER QUALITY ® PFIZER

SARCO in the boiler house...



Assuring dry steam with Sarco steam traps and some Sarco temperature control hook-ups in the boiler house.



A — Forged Steel Bucket Trap
B — Pipe Line Strainer
C — Temperature Regulator, TR-19
D — Inverted Bucket Steam Trap
E — Thermostatic Steam Trap
F — Temperature Regulator TR-21
G — Temperature Regulator 24-30
H — Float-Thermostatic Trap, type FTS
J — Float-Thermostatic Trap, type FTD-M

STEAM TRAPPING AND TEMPERATURE CONTROL problems begin right where steam is generated. The modern boiler plant with its maze of piping and auxiliary equipment offers striking evidence of the advantages of a complete line from one source of supply.

No one type of steam trap or temperature regulator provides the correct solution to all the varied problems presented.

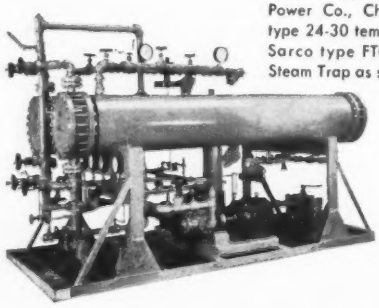
Sarco makes four distinct types of steam traps and can give you unbiased advice on the best type for any job, based on 30 years experience and thousands of installations. ***Write for trap selector chart 145-4.***

The Sarco line of simple temperature control for heating or cooling is complete. ***Full information in Catalog 600-16.***

It pays to standardize on Sarco—exactly the right type of trap or regulator, but all of one make—no divided responsibility!

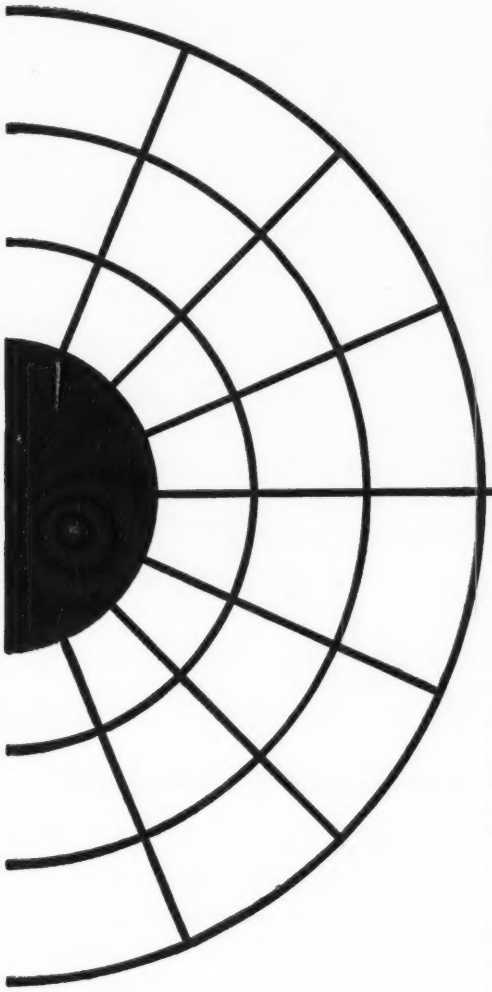
Sarco Company, Inc.
Empire State Bldg., New York 1, N. Y.
Branches in principal cities.
Sarco Canada Ltd., Toronto 8, Ont.

SARCO saves steam
improves product quality and output



Enterprise dual pump set to preheat 3,200 gph of Bunker C fuel oil to 225°F. Supplied by Enterprise Heat & Power Co., Chicago, Ill. with Sarco type 24-30 temperature regulator and Sarco type FTQ Float-Thermostatic Steam Trap as standard equipment.

423



Bemis Now Offers You Quantacolor

. . . to give your printed brand "MORE SELL"

You can get the sales benefits of QUANTACOLOR in your branded bags FROM BEMIS ONLY. It adds nothing to your bag cost. This is another extra Bemis service to make your brand sell better and more profitably.

What is Quantacolor?

Quantacolor is a scientific yardstick for making certain that the colors combined in any design or product are in harmony . . . that they *look right* together. Nature creates colors in four Quantas . . . and there are all colors of the spectrum in each Quanta. Colors from the same Quanta are *pleasing* together. Colors from different Quantas are *displeasing* together. Very slight changes, sometimes scarcely noticeable, will put a color into the Quanta that *agrees* with its companion colors.

Does Quantacolor actually help sell?

It has proved its sales value in many types of packaging and merchandise.

Does Quantacolor mean you must redesign your brand?

Not at all. Maybe your brand colors are in perfect harmony now. If so, Quantacolor will confirm it. If not, a slight change of a color will probably suffice.

Whether you use Bemis Paper Bags, Cotton Bags, Burlap Bags or Plastic Bags . . . you will benefit from Quantacolor. Ask for the details.

Bemis

BEMIS BRO. BAG CO.
408-C Pine St., St. Louis 2, Mo.

Give me details about Quantacolor and how it will help sales.

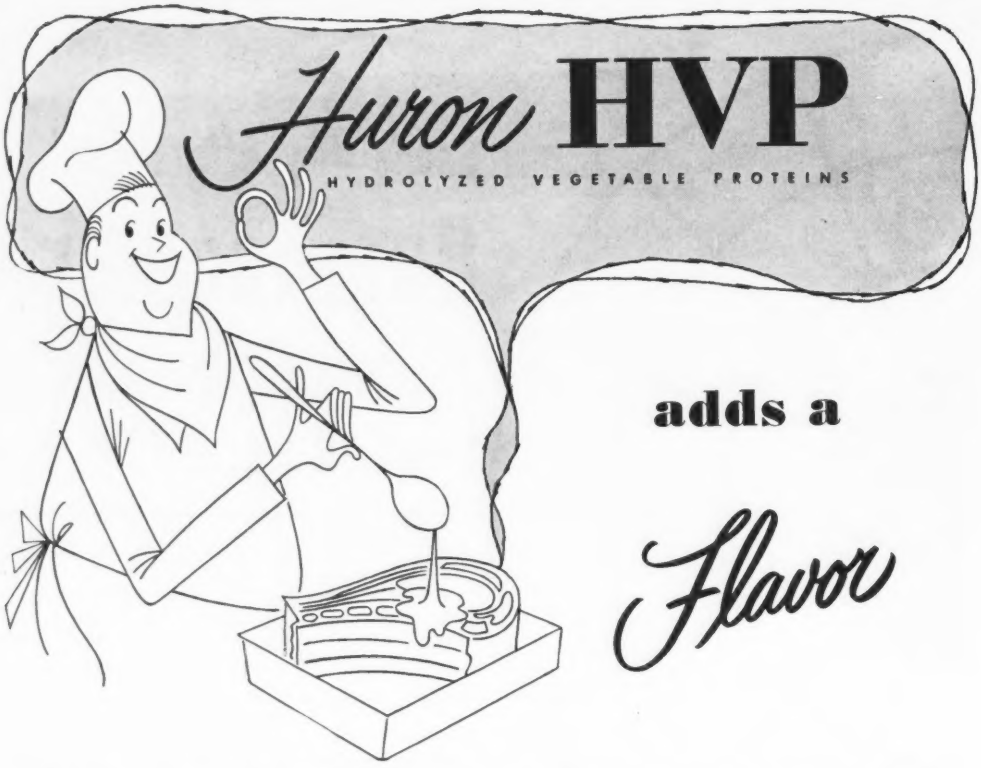
*Name*_____

*Company*_____

*Address*_____

*City, Zone, State*_____

For more information, use post card on last page.



like the broth from well browned beef

Huron HVP (Hydrolyzed Vegetable Proteins) produced from pure wheat gluten, have a flavor like that of the broth from well browned beef — a distinctly meaty taste useful in strengthening and extending the flavor of many foods—particularly in soups, gravies, sauces, etc. and in adding flavor to processed meat products.

For convenience and ease in use, Huron HVP are available in three different styles—in liquid, paste and powdered forms. The cost of all three forms is so small as to make them a practical ingredient for increasing taste appeal.

For full working sample and technical advice on use in specific food products, write to Technical Service Department at any of the following addresses—

THE HURON MILLING COMPANY • 9 PARK PLACE, N.Y.C. 7

Factories: Harbor Beach, Michigan

Sales Offices: 161 E. Grand Ave., Chicago 1 • 383 Brannon St., San Francisco 7 • 13 E. Eighth St., Cincinnati 2

Stokely-Van Camp Network Connected By White Trucks

Traveling billboards like these White PayLoad Tractors keep on the move for Stokely-Van Camp, Inc., joining the vast network of plants, warehouses and distributing points. These Whites are engineered for more payload . . . operating economy in Stokely-Van Camp, Inc., service.

How to Carry More in Your Market Basket on Wheels

IF YOUR payload is foodstuffs and the call continuously is for more goods . . . faster . . . more economically, then investigate the wisdom of White PayLoad Design for *your* business.

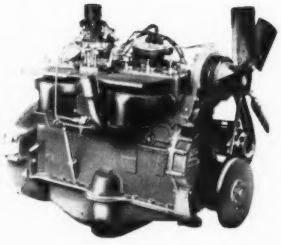
With foods...or freight of any kind...only Whites can be tailored to your exact operating needs. And only White can assure maximum payload at lowest operating cost . . . maximum dependability with the finest in driver and safety features.

Ask your White Representative for facts about White's PayLoad Procurement Plan, a sound engineering approach to today's operating problems that means *more* payload . . . *more* earning power . . . *lower* distribution cost.

THE WHITE MOTOR COMPANY • Cleveland 1, Ohio

White

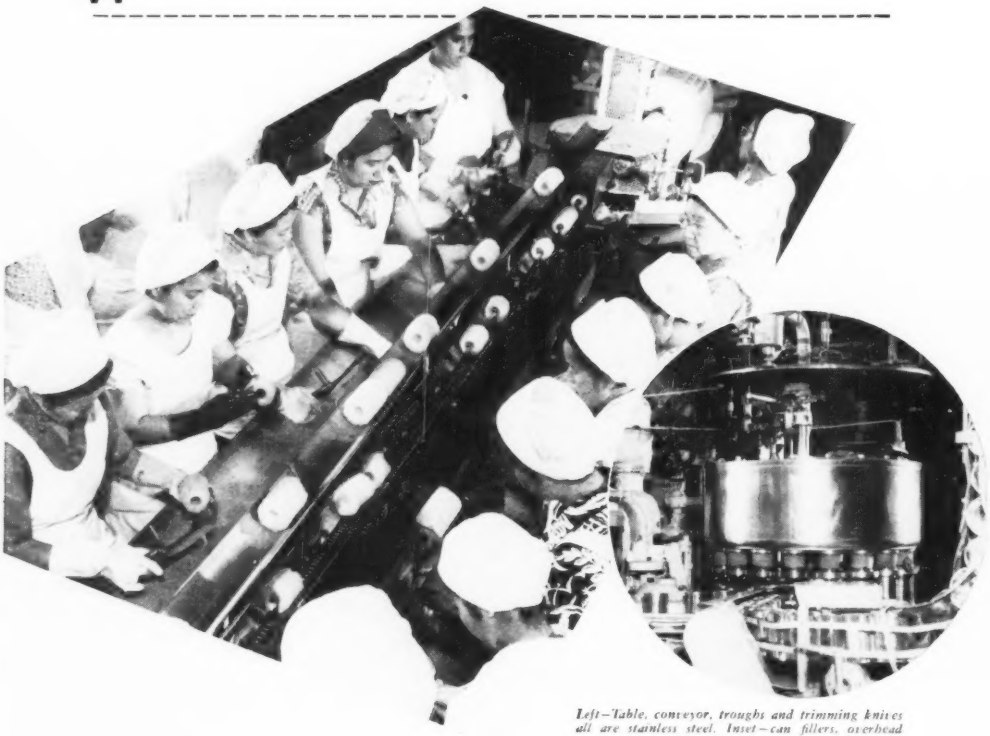
FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS



More Power . . . More Earning Power with White Engines

ENGINEERED *right* for today's operating conditions, White Engines earn more . . . save more. High-compression, high output and rugged, White Engines make possible maximum payloads within highway weight limits because there's more power per pound of engine weight. Designed for maximum fuel economy and longer life, too!

World's largest cannery is ENDURO-EQUIPPED



Left—Table, conveyor, troughs and trimming knives all are stainless steel. Inset—can fillers, overhead valves and piping are stainless steel.

Since 1930, The Hawaiian Pineapple Company has been using more and more stainless steel equipment. Stainless steel—much of it Republic ENDURO—is highly important to the successful year-round operation of this "world's largest cannery."

ENDURO Stainless Steel thrives on fruits and fruit juices. It stubbornly resists rust, corrosion and the action of food acids. It does not contaminate metallically—can be trusted to preserve flavor at its freshest, color at its truest.

ENDURO is remarkably easy to clean and to keep clean—a simple warm water rinse and a wipe usually restores its glassy-smooth surface to sparkling cleanliness.

And, ENDURO lasts! In food process equipment, it seems virtually immune to wear. Solid stainless steel, it has no plating to chip or wear away . . . never requires refinishing.

File the name ENDURO with your plans for plant expansion and modernization. Republic metallurgists are ready to work with you, and with your equipment suppliers, on any development involving current or future use of stainless steels. Just write:

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

See and Hear
"THE STORY OF STAINLESS"

Full-color, 16 mm sound film . . . 27 minutes running time. Dramatic . . . historic . . . interesting. Available to qualified groups without charge. Requires 16 mm sound projector. Send name of organization, type of projector, requested date to Ideal Pictures Corp., Dept. T-4651, 58 W. Water St., Chicago 1, Ill., or write Republic Steel, Dept. K, Cleveland 1, O.

Republic
REPUBLIC STEEL
ENDURO® STAINLESS STEEL

Other Republic Products include Ex-L-ite Tin Plate, Pipe, Sheets, Bolts and Nuts, Electrunite Tubing, Niles Barrels and Drums

THE NEWEST AGENT IN *flavor* TECHNOLOGY

Vanitrope improves **FLAVOR QUALITY** and intensifies flavor strength. Vanitrope is highly effective in **CHOCOLATE,** adding richness and stretching chocolate flavor. Its unique **VANILLA-LIKE** quality makes any imitation vanilla taste more like a rich, true extract. Vanitrope's stability at high **BAKING** temperatures is a great advantage. As a basic flavoring in **ICE CREAM,** Vanitrope improves quality and cuts cost. **CANDY MAKERS** are using Vanitrope widely. Vanitrope's great **STRENGTH** (16 to 25 times the flavor strength of vanillin) means **ECONOMY** (savings as

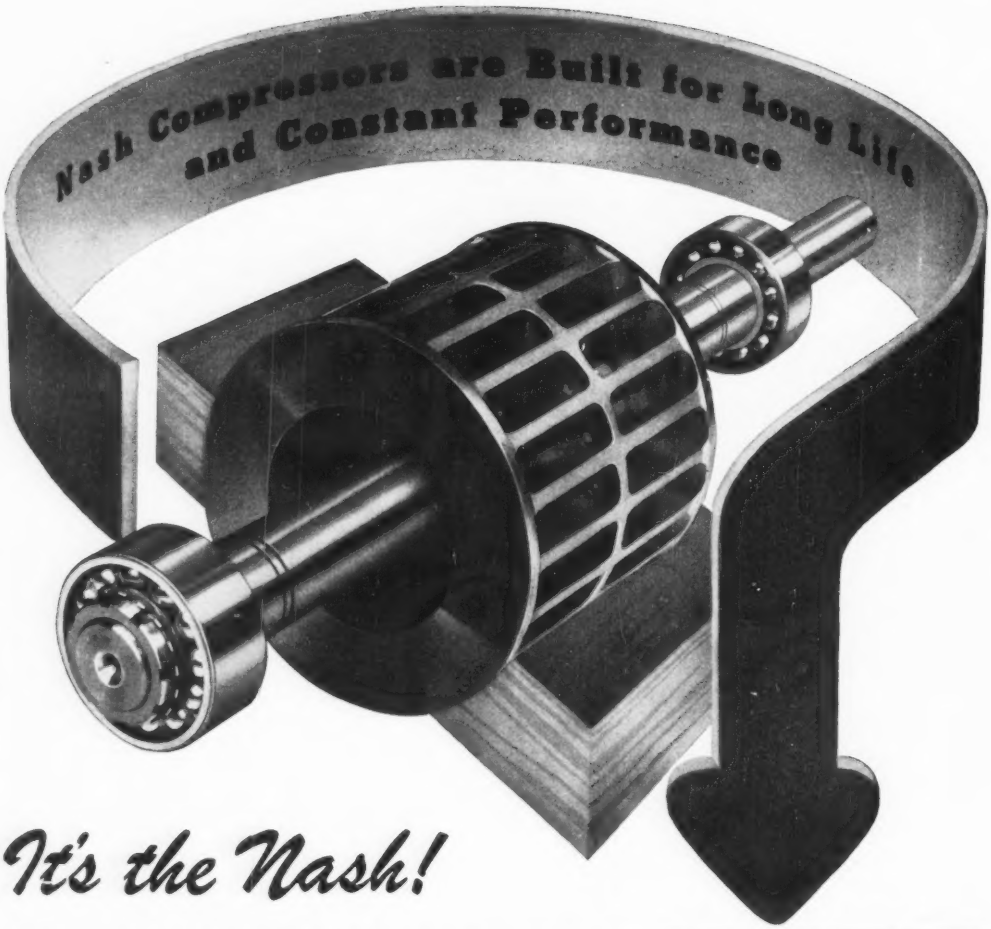
VANITROPE

WHITE CRYSTALLINE material (propenyl guaethol) developed through organic research by Shulton. Shulton's **TECHNICAL SERVICE** will assist in showing how Vanitrope can improve both flavor and cost in your product.

VANITROPE IS A CONTRIBUTION OF } *Shulton* INC.

FINE CHEMICALS DIVISION • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Nash Compressors are Built for Long Life and Constant Performance



It's the Nash!

The ability of Nash Compressors to maintain original performance over long periods is no accident. Nash Compressors have but a single moving element, the Nash Rotor. This rotor is precision balanced for long bearing life, and it revolves in the pump casing without metallic contact. Internal lubrication, frequent cause of gas contamination, is not employed in a Nash. Yet, these simple pumps maintain 75 lbs. pressure in a single stage, and afford capacities to 6 million cu. ft. per day in a single compact structure.

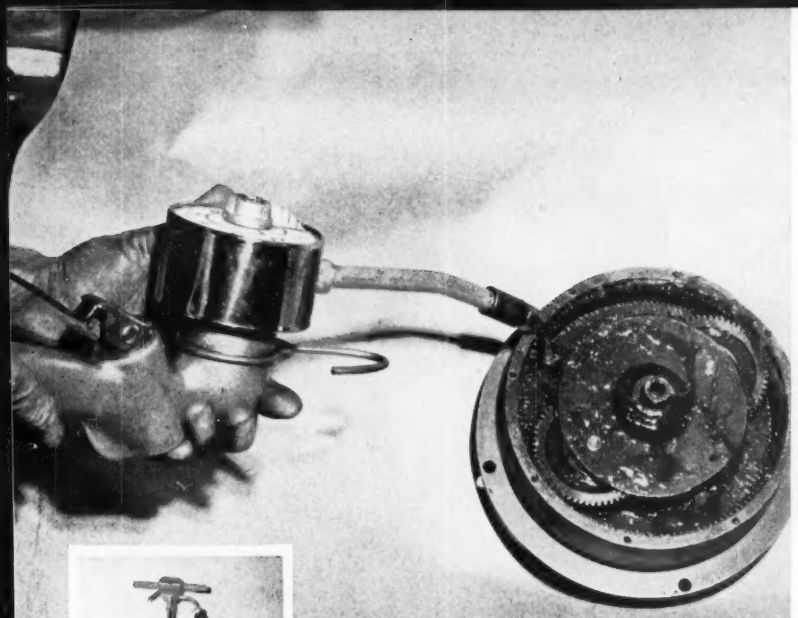
Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature Automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY

312 WILSON, SO. NORWALK, CONN.



Solves leakage problem . . .

● Multi-clean Products, Inc., St. Paul, Minnesota, manufactures industrial floor polishing and scrubbing machines. The machines are shipped with grease already installed in gear reduction units. The problem faced by this company was one of finding a grease that would stand up under hard service and not leak from the gear units. Greases tried either caused or threatened leakage troubles.

Called in on this problem, a Standard Oil lubrication specialist recommended STANOBAR Grease "S", a highly stable grease with a unique adhesive characteristic. Given an accelerated service test, STANOBAR did not leak from the gear unit, and its consistency showed no change that would later cause a leakage problem. There was no wear of gears or bearings. Adopted for use in the units, STANOBAR has solved this company's lubrication problem on every count. Officials have been able to eliminate the costly and troublesome practice of having all units returned to the factory, at 12 months intervals, to be repacked with grease.

STANOBAR
TRADE MARK
Grease

The same lubricating qualities of STANOBAR that solved this problem for Multi-clean Products, Inc. can serve you in a wide variety of applications. A Standard Oil lubrication specialist will be glad to discuss those applications with you. He's right there in your section of the Midwest. You need only phone your local Standard Oil office. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

C. L. Daub is the Standard Oil lubrication specialist who helped Multi-clean Products, Inc. solve an important lubrication problem through his recommendation of STANOBAR Grease.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job assistance is always available to the industries in the immediate area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest. Call for the services of your Standard Oil lubrication specialist today. When he stops at your plant, be sure to get information on these outstanding products:

STANOIL Industrial Oils—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One of two grades can replace a wide variety of special oils and lubricants.

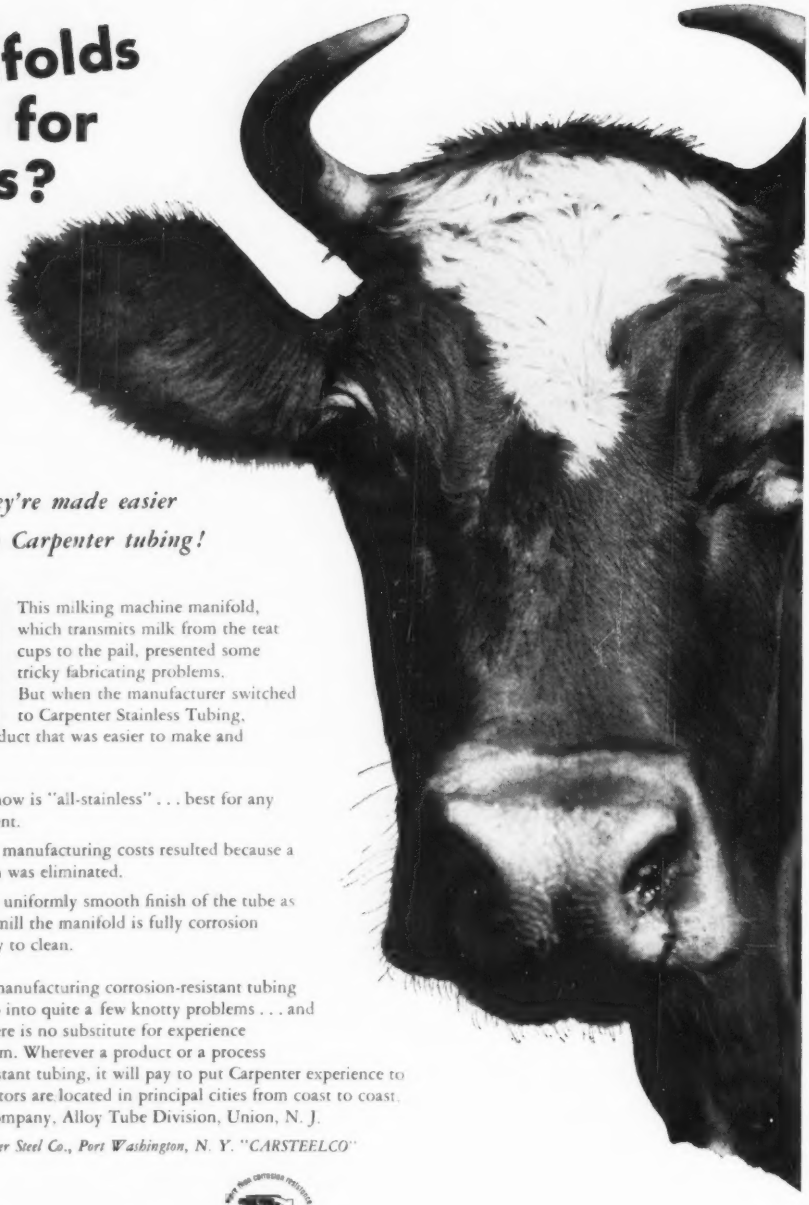
CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specially developed for its intended use. The grades range from a fingerprint remover to a heavy semi-solid that protects against corrosion for years under the most severe outdoor exposure.

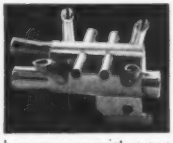
STANDARD OIL COMPANY

STANDARD *(Indiana)*

manifolds for cows?



Sure . . . and they're made easier and better with Carpenter tubing!



This milking machine manifold, which transmits milk from the teat cups to the pail, presented some tricky fabricating problems. But when the manufacturer switched to Carpenter Stainless Tubing, he came up with a product that was easier to make and easier to keep clean:

- the manifold now is "all-stainless" . . . best for any sanitary equipment.
- real savings in manufacturing costs resulted because a plating operation was eliminated.
- because of the uniformly smooth finish of the tube as supplied by the mill the manifold is fully corrosion resistant and easy to clean.

When you have been manufacturing corrosion-resistant tubing for 25 years, you bump into quite a few knotty problems . . . and we have found that there is no substitute for experience in solving many of them. Wherever a product or a process involves corrosion-resistant tubing, it will pay to put Carpenter experience to work for you. Distributors are located in principal cities from coast to coast. The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y. "CARSTEELCO"

Carpenter

STAINLESS TUBING & PIPE

Analysis · Tolerance · Finish

· guaranteed on every shipment

Season's Greetings!
P. Val. Kolb, President
William X. Clark
Sales Manager
Sylvester A. Ryan
Asst. Sales Mgr.
Keith M. Baldwin
Asst. Sales Mgr.
Kenneth Leggett
Asst. Tech. Dir.
R. Steele Sherratt
New York
Michael Padley
New York
Gordon W. Weed
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Buffalo
Dan E. Smith
Washington, D. C.
Jack A. Revordi
Chicago
Lyle P. Carmony
Kansas City
Warren Keller
Flour Service
Kansas City
To all our friends, our sincere wishes for a very Merry Christmas and a Happy and Prosperous New Year.
President

What do you do when you don't have the right size v-belt in stock?

1

Contact your supplier for a replacement

...and wait for delivery
...wait—and watch production stay at zero

2

Send someone to get the required belt

...and pay your employee while he goes for the belt
...pay through loss of production

3

Stock VEELOS...

...and always have the *right size* belt when you need it
...any length can be made up from a 100-foot reel
...inventory is automatically maintained
...available from 350 distributors

GET ALL THE FACTS

This Veelos Data Book gives complete details about construction, installation and uses. Write for free copy of this money-saving book today.

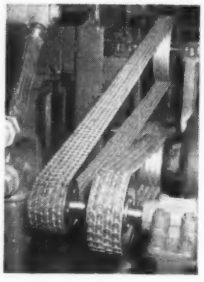
MANHEIM MANUFACTURING & BELTING COMPANY
605 Manbel St., Manheim, Pa.

VEELOS in stock is Production Insurance

Belts for replacement always on hand—just 4 reels of Veelos in the 0, A, B and C widths can replace up to 316 different sizes of endless v-belts.

Link construction permits quick installation—without removing outboard bearings.

Adjustability provides controlled tension on each belt—vibrationless, full power delivery is assured.



VEELOS
THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH · ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof, static conducting. Also double V in 0, A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

THE DALMATIAN, originally bred to run with coaches and carriages, may suffer from technological unemployment today but he is still popular. He is a loyal, one-family dog.

The pure breed is white with either brown or black spots, round and varying in size. He should measure 19 to 23 inches in height.

For Safety in Shipping

Buy the Box with a Pedigree

Dependable Packaging Since 1872

BORDEN'S Grated American Cheese is one of many famous national brand products shipped by truck, rail, water or air in Union corrugated containers—the boxes with a pedigree.

Reserve strength to withstand the hazards of all forms of shipping is built into Union boxes. Rigid quality control begins in Union forests and follows production through the world's largest integrated pulp-to-container plant and four strategically located box plants.

So, for safety in shipping, do as many makers of national brand products do—call on Union. 75 years of leadership in package engineering and mass production techniques is assurance you will get the right box for your product at the right price, delivered where you need it *when you need it.*

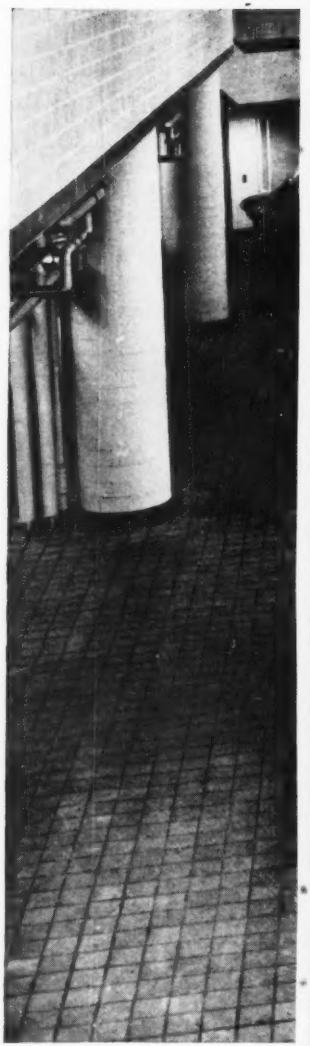
UNION Corrugated Containers

UNION BAG & Paper Corporation

Principal Offices: WOOLWORTH BLDG., NEW YORK 7, N. Y.

Corrugated Container Plants: SAVANNAH, GEORGIA • CHICAGO, ILLINOIS • TRENTON, NEW JERSEY

How electrical brains help control this food processing operation



A simple, yet complex, control system at the new Duquesne Brewery in Pittsburgh is a typical example of how Westinghouse is working with different kinds of food processors in helping them devise ways to increase production and efficiency.

Electronic mind enables one man to control many operations

Just one operator can start, control and stop many different operations simply by pressing master pushbuttons. At the same time, indicating lights show him the exact flow of materials from one stage in the process to another. This maintains an accurate check on materials, and tells him which lines are in use.

Automatic operations speed up production

Grain weighing is a good example of just one of the many automatic operations that speed up Duquesne's production. The press of a button fills a hopper, and a light indicates when it's full and weighed. An automatic release mechanism then lets the grain fall to the cleaning operation below. After the hopper is empty, other automatic controls start equipment which draws up more grain and starts another cycle.

Other special equipment assures dependability

Duquesne also uses Westinghouse drives and power distribution equipment to gain maximum safety and dependability. For example, explosion-proof motors give them sure protection in hazardous locations and splash-proof motors assure continuous operation in wet areas. Two Westinghouse Power Centers supply electricity safely and efficiently to all operations.

Call Westinghouse early on your next project

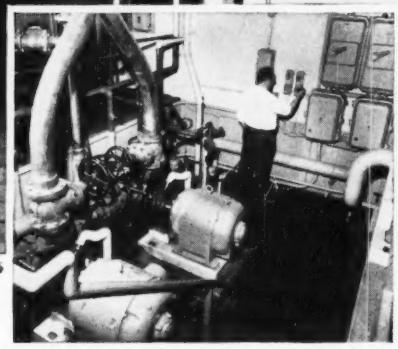
Whether you need a simple drive or a complex control system, call Westinghouse early on your next project. Let Westinghouse help you devise ways to improve your production. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94922

YOU CAN BE **SURE**...IF IT'S

Westinghouse

EQUIPMENT FOR FOOD PROCESSING

They did what you can do to cut costs



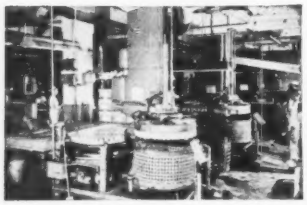
These Westinghouse Splash-proof Motors drive pumps that move beer to storage tanks for aging. Sure protection is provided by Westinghouse watertight circuit breakers mounted on the rear wall.

Part of Duquesne's unique "electrical brain" control panel. White lines show different conveyor systems and lights indicate the different flow routes of materials from one stage in the process to the other.

(ADVERTISEMENT)

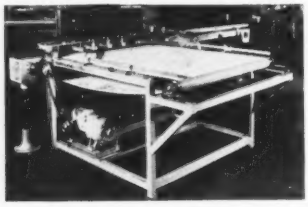
TIME and MONEY SAVING EQUIPMENT FOR THE FOOD PACKER

Three of our many installations, which have proven profitable to food packers, are illustrated and described below. These are offered as examples of the results of our work in collaboration with food packers and on specific problems. If you have similar or other problems in your plant it will pay you to talk to a Barnes' process engineer. There is no obligation for this service.



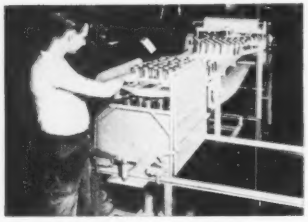
Load 500 Jars Per Minute

This Barnes retort crate loader handles 500 baby food jars per minute. It is one of many different machines designed and manufactured by Barnes to help the food packer lower costs, speed up handling, and minimize breakage.



Unscramble 500 Jars Per Minute with Barnes Single Filer

Here's a new, efficient method of unscrambling empty jars. The illustration shows operating end of machine where girls are positioned while dumping cases of glass onto the receiving conveyor belt. Jars are discharged to conveyor at the rate of 500 to 600 per minute, determined by size and shape.



Unload Over 600 Cans Per Minute with Barnes Packaged Can Unloader

This new dual purpose machine can be operated with only two men in continuous production while unloading 3 to 4 bags of cans per minute. The Barnes unloader handles 3 bags, each containing 265 No. 303 cans per minute, or 795 cans.

FREE ADDITIONAL DATA on these and other time and money savers for the food packer will be sent upon request. Write today. Ask for bulletin F1252.

W. F. & JOHN BARNES

W. F. and JOHN BARNES

PROCESS EQUIPMENT DIVISION 330 SOUTH WATER STREET, ROCKFORD, ILLINOIS

Some Questions and Answers About the Martin Aseptic Canning System

Q. Exactly, what is the Martin Aseptic Canning System?

A. It is a system that provides a means of filling a sterile product into a sterile container, within a sterile atmosphere and closing it with a sterile lid.

Q. Is further processing of the product necessary?

A. No.

Q. Has the system been available for a long time?

A. No. Although short-time high-temperature sterilization has been available or possible on many products for a good many years, it wasn't until the Martin System was developed that there was equipment available for Commercial exploitation of the advantages gained from short-time high-temperature sterilization.

Q. What does W. F. and John Barnes Co. have to do with the system?

A. They are sales representatives for the Martin Aseptic Canning System and offer engineering, technical and service assistance on the installation and operation of the equipment.

Q. Where can we obtain more information about the merits of this system?

A. By writing to W. F. and John Barnes Company, Process Equipment Division, 301 South Water Street, Rockford, Illinois. Ask for bulletin E1252.

TEST YOUR PURIFIER I.Q.

If you can score 100% on this quiz you can cut costs drastically in your plant

Score 25 for each Question

Question:
WHAT IS A PURIFIER?

Answer:
A purifier is a mechanical separator engineered to fill the need of cleaning and drying steam, air, vapor and gas. Often referred to as a mist extractor, separator or scrubber.

Question:
HOW DO PURIFIERS SAVE MONEY?

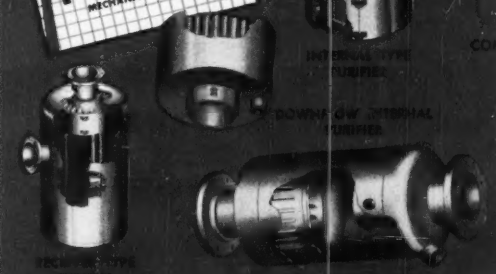
Answer:
Purifiers accomplish savings in many ways. They (1) Clean up steam thus protecting reciprocating engines, turbines, superheater tubes and steam lines (2) purify exhaust steam and vapors of damaging oil and acids (3) remove moisture and oil from gas lines between and after compressor stages (4) reclaim valuable liquids in gases and vapors in evaporator operation (5) protect control valves and air tools (6) deliver clean, dry steam to ejectors, steam and vacuum canning equipment (7) keep water and dirt out of paint spray equipment.

Question:
WHAT TYPE OF PLANTS NEED PURIFIERS?

Answer:
Every industrial plant, particularly power, chemical, food and petroleum plants profit through their use. Air tools, common to all plants, last much longer when protected against dirt with low cost Hi-eF Purifiers. Spray painting equipment gives a better finish when dirt and water are removed with a Hi-eF Purifier.

Question:
WHICH MAKE PURIFIER HAS THE GREATEST EFFICIENCY?

Answer:
In an actual comparative performance test of the seven principle makes of industrial separators, the Hi-eF design with no moving parts, proved considerably more efficient over the complete capacity range. Results of this test are available upon request.



FREE!

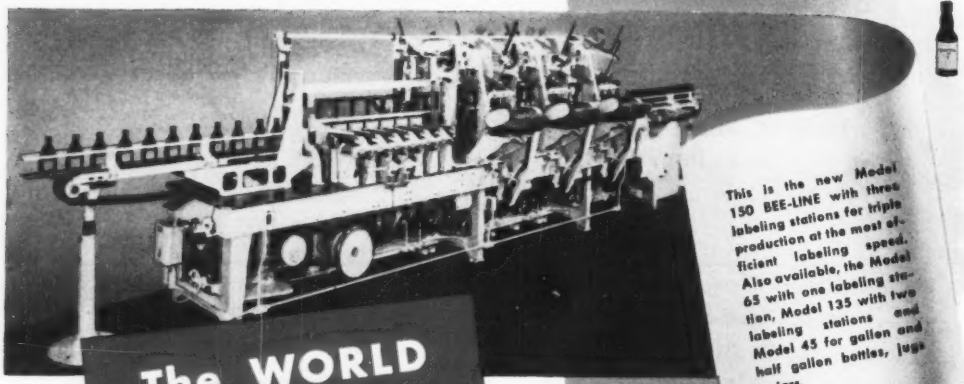
PURIFIER DIVISION
THE V. D. ANDERSON COMPANY
1995 West 96th Street • Cleveland 2, Ohio

Gentlemen: Yes, I want to know more about purifiers. Please send without obligation catalogs on the following types:

- ☐ General Catalog
- ☐ Line
- ☐ Receiver
- ☐ Internal
- ☐ Downflow Internal
- ☐ Small Line

Name .....
Company .....
Address .....
City ..... Zone ..... State .....

ALL on the BEE-LINE for better labeling



This is the new Model 150 BEE-LINE with three labeling stations for triple production at the most efficient labeling speed. Also available, the Model 65 with one labeling station, Model 135 with two labeling stations and Model 45 for gallon and half gallon bottles, jugs or jars.

The WORLD BEE-LINE LABELER...

for fully automatic, dependable, precision application of labels to glass containers. Operates in a straight line, gently but surely, without detours, collisions or traffic jams. Meets your labeling requirements however varied or unusual.

"YOU GET THE BEST LABELERS IN THE WORLD"

ECONOMIC MACHINERY COMPANY
WORCESTER 3, MASSACHUSETTS
DIVISION OF GEO. J. MEYER MANUFACTURING CO.
MILWAUKEE, WISCONSIN
New York Philadelphia Chicago San Francisco Los Angeles Denver Salt Lake City
Seattle Portland Montreal Toronto Winnipeg Vancouver

RIGHT IN YOUR OWN BACK YARD... BY WEST

JUST LET TITUS TWILLIGER, THE OFFICE PENNY PINCHER GET NEAR THOSE OLD-FASHIONED FOLDED TOWELS... AND THEN WATCH OUT FOR THE BLIZZARD.
AND THAT'S THE SKINFLINT WHO MAKES US SIGN FOR PAPER CLIPS!
AND THE WEST MAN TOLD HIM YESTERDAY HE COULD CUT PAPER TOWEL COSTS 40% WITH WESTROLL
SOME DAY I'M GONNA CLEAN UP HIM INSTEAD OF THE FLOOR!
HE'D BE WASHED UP FOR GOOD IF THE BOSS COULD ONLY SEE HIM!
HE GOES THROUGH TOWELS LIKE RABBITS THROUGH A LETTUCE PATCH!
BETTER GO WEST, OL' MAN, GO WEST!

Recognize the type? You'll find him everywhere. Wherever paper towel dispensers say, *"Help yourself, there's no limit to the use or abuse,"* of this necessary washroom service!

Paper towel costs can be reduced up to 40%. How? With WESTROLL Paper Towels and Dispensers.

WESTROLL Dispensers are designed to feed just enough toweling – *and no more!* For a thorough hand drying job. Yet, WESTROLL towel service is never miserly. A choice of 3 feed-speeds fits WESTROLL service to any type of washroom traffic.

WESTROLL Paper Towels are soft, absorbent, 'right' in wet strength. And 33⅓% more economical in regular use than interfold towels. Add to this initial saving, the extra uses found for 'easy-to-pilfer' towels; more frequent cabinet fillings; extra janitorial work. That's the real picture. As your WEST man can prove in a 10-minute demonstration.

WESTROLL Paper Towel Service is only one of many WEST products for the promotion of sanitation. Others include floor maintenance materials . . . washroom service . . . disinfectants . . . deodorants . . . insecticides . . . cleaners . . . soaps . . . protective creams. West is also the exclusive distributor of Kotex Sanitary Napkins sold through vending machines.

WEST DISINFECTING Company

42-16 West Street
Long Island City 1, N. Y.

START SAVING...

the day you install WESTROLL Towels and Dispensers!

How about a WESTROLL demonstration?

Name _____ Title _____

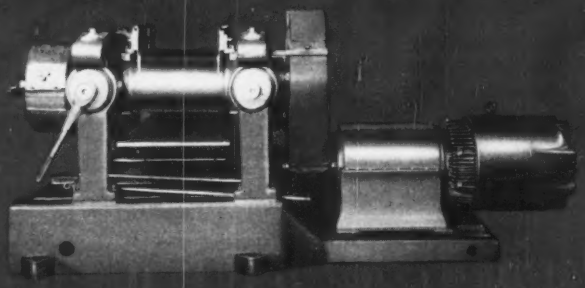
Company _____

Address _____

City _____ Zone _____ State _____

Dept. 8

For more information, use post card on last page.



When you use a power drive which is an assembly of motors, pulleys and belts, chains and sprockets, gearing, speed reducers, etc., you waste time and money in purchasing, handling and assembling these various units into the final drive.

Master power drives designed as complete units with component parts matching size for size and rating for rating offer you considerable saving in space and money . . . especially in the larger sized units.

best for the BIG ones too

So don't put up with "make-shift" assemblies when you can select from Master's broad line, standard units which easily combine to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features in one compact unit that you can use RIGHT where you want it.

Use the RIGHT power drive to increase the saleability of your motor driven products . . . improve the economy, safety, and productivity of your plant equipment. That's the horsesense way to use horsepower.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

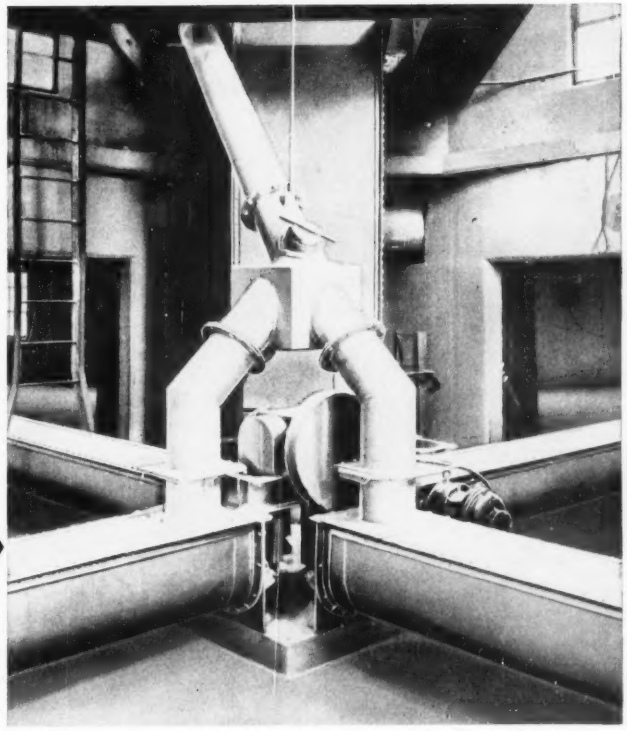
Why LINK-BELT "total engineering" means better screw conveyors for you...

LINK-BELT integrates all components to give you the right screw conveyor for your job

Don't be fooled by the apparent simplicity of a screw conveyor. It *is* simple in design, but there are many important factors that must be considered to give you top performance.

That's why Link-Belt's broad materials handling experience is so important... why Link-Belt Screw Conveyors are first choice on so many demanding jobs. And because Link-Belt makes all types and sizes of components, you get exactly the right screw conveyor for your particular requirements.

It's easy to see why "total engineering" results in top screw conveyor performance. Call the Link-Belt office near you for complete information.



Four Link-Belt Helicoid Screw Conveyors distribute material from Link-Belt Bucket Elevator discharge.

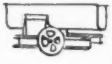
LINK-BELT designs and builds all components!

SCREWS—Link-Belt makes a complete range of conveyor screws—Helicoid, Sectional Flight, Cut Flight, Ribbon Flight, Paddle type and special

types for such diverse applications as feeding, conveying, mixing, agitating, stirring, blending, etc.

HANGERS—Available in a variety of styles and mountings, with various bearing materials, and steel or cast hanger frames.

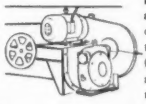
TROUGHS—Link-Belt builds flanged, angle flanged, flared, rectangular, dust-seal, jacketed and drop-bottom types in steel or alloy metals. Variety of connections, supports, covers and clamps offers added design flexibility.



SPOUTS & GATES—Plain discharge spouts can be fixed or detachable. Discharge gates, flat or curved slide, can be hand or rack-and-pinion operated.

SHAFTS & COUPLINGS—Conveyor couplings and end shafts are designed for adequate torsional strength and have jig-drilled coupling bolt holes for accurate alignment.

TROUGH ENDS—Steel or alloy metal plate or cast trough ends to match all trough shapes, provide required shaft bearing support and alignment. Seal glands to protect bearings, if required.



DRIVES—Link-Belt designs and builds many forms of drives to suit specific conditions—enclosed gear, Electro-fluid, P.I.V. variable speed, and chain drives of various types.

Link-Belt can also supply a full range of flanges, thrusts, covers, saddles and countershaft ends

LINK-BELT

SCREW CONVEYORS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in Principal Cities. 12,898

There's

Something Special

about these spices—

and

Pneumatic

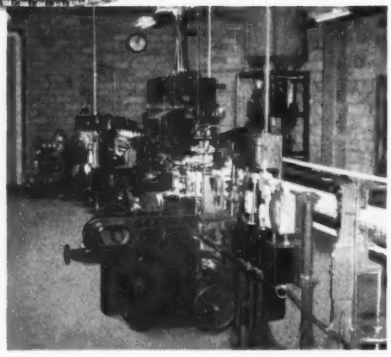
supplies it!

FRENCH'S quality is something special, of course. That's not news to anyone. Their new package, however, *is news.* Its tuck-top design seals in all flavor and permits the user to open and re-close the package easily — without tearing or mutilating it in any way . . . retaining the flavor while the package is on the shelf.

The trick is turned by Pneumatic equipment which combines a product-protecting inner lining with an outer carton whose lightly spot-glued top lifts under slight pressure. This "package within a package" is a winning combination . . . for FRENCH'S and for many other leading manufacturers of dry food products who use it.

This kind of engineering ingenuity is typical of Pneumatic equipment — and largely responsible for its "lower cost per container" operation.

PNEUMATIC SCALE CORP., LTD., 91 Newport Ave., Quincy 71, Mass.
Also: New York; Chicago; San Francisco; Los Angeles; Seattle; Leeds, England.



Automatic line used in production of French's new tuck-type spice carton at Rochester, New York. Combination includes Pneumatic Small Double Package Maker, Three Scale Weigher and Rotary Top Closure.

PNEUMATIC

Packaging and Bottling Equipment

Merchant's Refrigerating Company Picks Modern Carrier Ammonia Equipment

New warehouse at Hopkins has 1,750,000 cu. ft. refrigerated space on one floor

They can freeze up to 300,000 pounds of bulk every twenty-four hours at the new Merchant's warehouse in Hopkins, Minnesota, capable of storing 21 million pounds of food products. They can handle products quickly and easily because the entire warehouse is on one level.

Modern Carrier ammonia refrigerating equipment was selected for this job because it fit so well into the modern design of this new warehouse. Its compactness saved space. Its accessibility saves time. Its economical operation saves money.

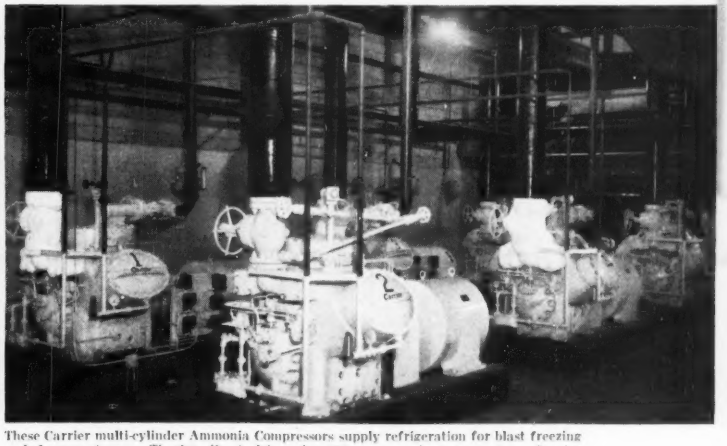
Carrier Reciprocating Ammonia Compressors, in a low temperature two stage system, serve the frozen food storage rooms maintained at –10° F as well as the blast freezers operated at –30° F.

For efficient, economical heat disposal, six Carrier Ammonia Evaporative Condensers are located on the roof of the engine room.

Carrier Ammonia Cold Diffuser coil and fan assemblies, mounted above the blast freezer spaces, provide a steady flow of sub-zero air, which is evenly distributed over the product to be frozen by special directional air discharge ducts.

Carrier

AIR CONDITIONING
REFRIGERATION
INDUSTRIAL HEATING



These Carrier multi-cylinder Ammonia Compressors supply refrigeration for blast freezing and freezer storage. They're direct driven by 720 rpm synchronous motors. Carrier Ammonia Compressors come in a wide range of capacities, from 5 to 200 horsepower.

There's No Catch in It!

No, not a catch anywhere in this Fairbanks-Morse *bladeless* impeller. That's how food damage losses are eliminated and handling costs *cut way down!*

The chain in the picture follows the water path through the single channel impeller . . . you can see there are no blades or projections to catch and damage food products.

Even the most delicate fruits and vegetables . . . *even* hard-boiled eggs . . . can be handled without damage with this Fairbanks-Morse Bladeless Impeller Pump.

For complete information, call your Fairbanks-Morse Branch Pump Engineer or write to Fairbanks, Morse & Co., Chicago 5, Ill.

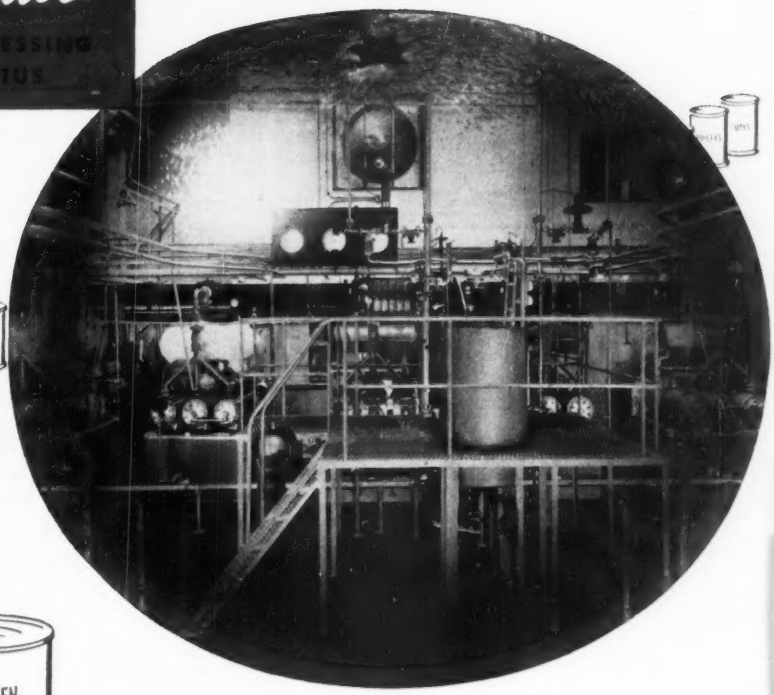
FAIRBANKS-MORSE,

a name worth remembering when you want the best

PUMPS • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY • SCALES • HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

Votator

FOOD PROCESSING APPARATUS



WIDE APPLICATION

FOOD PRODUCTS	FUNCTION OF VOTATOR APPARATUS
Cream Style Corn	Sterilizing and Cooling
Dog Food	Cooking, Sterilizing and Cooling
Chocolate Milk Drink	Sterilizing and Cooling
Edible Starch (For Salad Dressing)	Cooking and Cooling
Pie Filling	Cooking, Pasteurizing and Cooling
Strained Food	Sterilizing and Cooling
Soup	Sterilizing and Cooling
Lard	Chilling and Plasticizing
Margarine	Continuous Manufacture
Shortening	Chilling and Plasticizing
Sweetened Condensed Milk	Cooling and Crystallizing of Sugars
Invert Syrup	Cooling and Crystallizing of Sugars
Eggs	Pasteurizing and/or Chilling
Concentrates, Fruit Juices and Purees	Slush-Freezing
Juice Concentrates	Enzyme Inactivation, Sterilization, Cooling

Continuous slush-freezing

SEALS IN FLAVOR

This VOTATOR* Heat-transfer Apparatus converts concentrated citrus juice to a sherbet-like ice in just a few seconds . . . in a closed-system, continuous process. Thus air is excluded, and chances of contamination eliminated. Flavor, vitamin content, and purity are safeguarded.

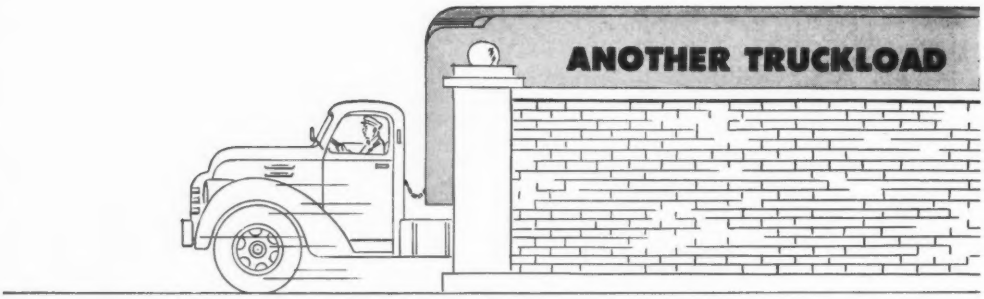
The operation is under precise, automatic control. Not only are variations from human operator error ended, but product handling and labor requirements are drastically reduced.

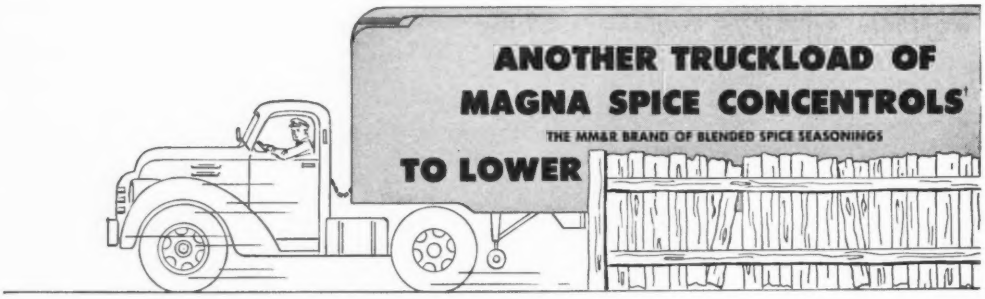
Throughout the food processing field, VOTATOR Heat-transfer Apparatus employing scraper blades on the heat transfer surface is used for heating and cooling, sterilizing, plasticizing, emulsifying, crystallizing, quick-freezing and aerating. For complete information write The Girdler Corporation, Votator Division, Louisville 1, Kentucky.

*VOTATOR - Trade Mark Reg. U. S. Pat. Off.

The GIRDLER Corporation

VOTATOR DIVISION





ANOTHER TRUCKLOAD OF
MAGNA SPICE CONCENTROLS'
THE MM&R BRAND OF BLENDED SPICE SEASONINGS
TO LOWER FOOD SEASONING COSTS*
*DATA ON REQUEST

'T.M. REG. APPLIED FOR

Every food processor who uses crude spices or dry soluble seasoning will do better with MAGNA SPICE CONCENTROLS. You, too, can count on absolutely uniform control of your flavors. You'll cut seasoning costs from 20% to 40%. And — you can make the change with no change in your present seasoning.

The MAGNA man is the man to see. Write us.

Magnus, Mabee & Reynard, inc.

Since 1895 ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS

16 Desbrosses Street, New York 13, N. Y. · 221 North La Salle Street, Chicago 1, Illinois

It's smart to stick with Swift's Adhesives

They serve you and the grocer, too!

In modern, self-servicing merchandising—where eye appeal often makes the sale—Swift's Adhesives serve successful manufacturers in many important ways. For example, they provide a lasting bond for labels on cans, bottles and jars . . . maintain the appearance of paper products . . . keep packages neatly sealed.

When you need adhesives, always remember—

- Swift has years of specialized experience in adhesives production.
- Swift works with a broad range of quality raw materials.
- Swift has extensive adhesives manufacturing facilities . . . distribution points from coast to coast.

Three adhesives for food producers:

Hot Pick-Up Gum—Swift offers good selection for hot or cold cans or glass. Effective on fast or slow lines.

Lap Pastes—that cut wrinkling, resist the effects of sweating. Economical . . . smooth running.

Case Sealer—the right kind for every use. A wide selection including fast sealing adhesives for cases that are placed immediately in freezers.

Flotill Products, Inc., Stockton, California, makes good use of Swift's Adhesives. One of the most important applications is the sealing of labels neatly, attractively *on bottles and cans.*

Call **SWIFT** first for **ADHESIVES**

Swift & Company
Adhesive Products Department
Chicago 9, Illinois

This offer expires Jan. 31, 1953

Please send your ———lb. introductory trial shipment of

☐ Hot Pick-Up Gum. (Describe can temperature range)
☐ Lap Paste. (Describe type of operation)
☐ Case Sealer. (Describe pressure time)

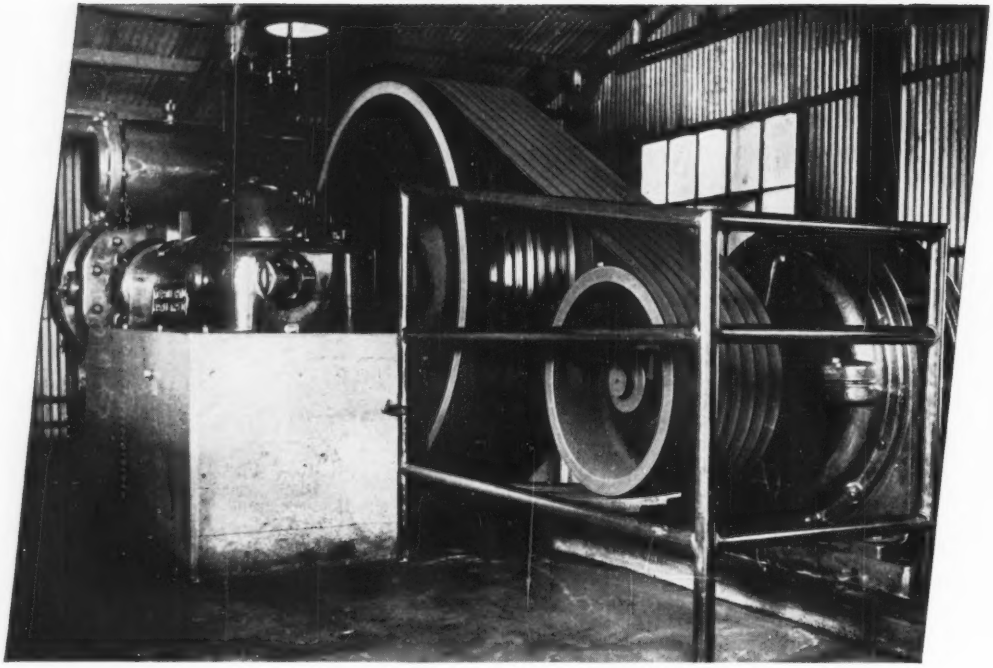
These products, at the quantity price, will be tested for use in our operations. We understand, if not fully satisfactory, they may be returned for credit at your expense.

Name _____ *Title* _____

Firm Name _____

Address _____

City _____ *Zone* _____ *State* _____



Keep your production in the groove with **Thermoid V-Belts**

Production men, in all kinds of industries, rely on the greater strength and longer life in Thermoid V-Belts to provide smooth, efficient performance and long wear . . . keep production in the groove.

From huge multiple V-Belts of rayon grommet construction to the smallest fractional horsepower belts, you can always depend on Thermoid quality.

The result is V-Belts with minimum stretch and extreme flexibility . . . designed to transmit maximum power without slippage . . . able to withstand high speeds and absorb shock.

All these advantages add up to lower operating and maintenance costs, and in the long run, the most economical V-Belts you can specify for the job.

Call your nearest Thermoid distributor today. He has a complete range of sizes to meet your requirements. And for your special V-Belt problems, experienced Thermoid Sales Engineers are always ready to help you.

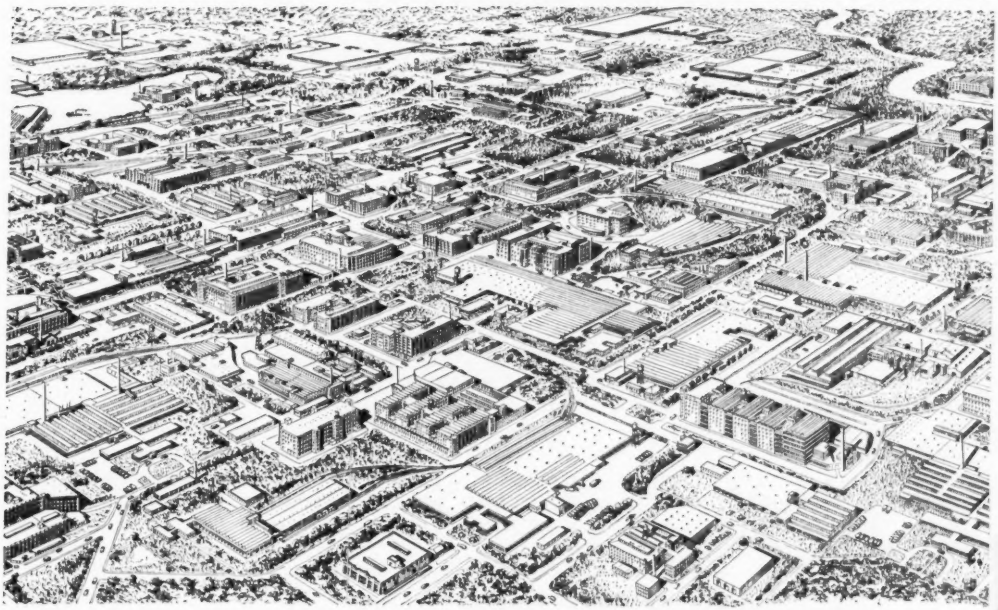
Thermoid Industrial Rubber Products — Quality Service

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah



Thoughts from Canco City

You are looking at a mighty unusual town.

It is Canco City—a far-flung American "workshop" of container plants between the Atlantic and Pacific, grouped together by an artist's magic hand.

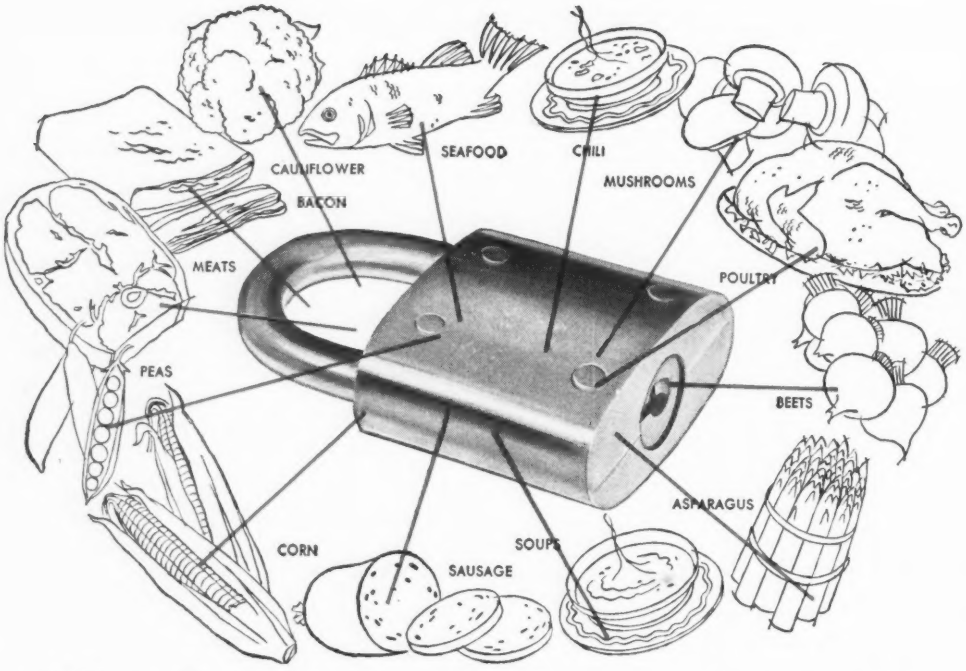
Canco City is a city of 35,000 citizens—a community of people with diversified skills, hobbies and interests; just like you and the neighbors in your home town. These people are bound together with a common purpose: Planning and making better containers for your industry.

Now, at the close of the year, they pause to reflect upon the work they have done for you and to trust in all sincerity that the job for you has been the finest in the world.

Everyone in Canco City takes this opportunity to extend Season's Greetings to you . . . and everyone hopes that the New Year will bring to you and your community both prosperity and peace of mind.

AMERICAN CAN COMPANY

Containers—to help people live better! CANCO



"Lock in" Fresh Sales Appeal!

—with ZEST, the Amazing Seasoning that seals in Natural Food Flavors!

The most important single thing you have to sell is *flavor!* Don't leave it to chance. "Lock In" all of the fresh, natural flavor that builds repeat business—by adding ZEST to your foods. More and more processors are discovering how ZEST, Staley's pure Monosodium Glutamate *magnifies natural food flavors* without adding any aroma or flavor of its own.

ZEST requires no changes in your formulas either! Simply add a small amount of it before, during or after processing. Low cost ZEST guards against "Flavor Fading" in meats, vegetables, fish, soups, sauces, poultry . . . and scores of other foods. Once you have tried ZEST you'll never be without it!

Zest®

STALEY'S 99+% PURE MONOSODIUM GLUTAMATE

WRITE TODAY for more complete information on ZEST and its effective use as a "flavor improver" and sales stimulator for *your* products.

A. E. STALEY MFG. CO., Decatur, Illinois

These Other Staley Products Can Make Your Foods Look, Keep and Sell Better!

Sta-Sol® Lecithin—Staley's pure lecithin concentrate speeds mixing, improves flavor, increases moisture retention in your processed foods.

Sweetose®—Staley's patented enzyme-converted corn syrup gives better color, firmer texture to fruits . . . improves the texture and appearance of vegetables. It also replaces a large percentage of the high priced sweeteners ordinarily used.

Staley's Starches—improved, thermophile-free starches especially compounded for spoilage-resistant, better-bodied processed soups, sauces and vegetables.

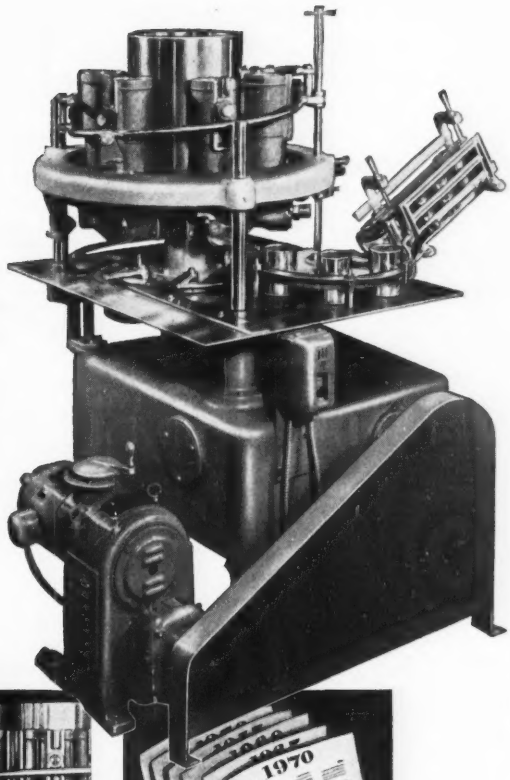
STALEY

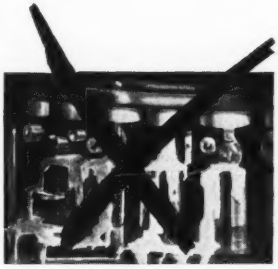
Staley PRODUCTS

Research Pioneers in Products from CORN and SOY BEANS®

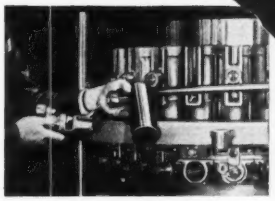
Pfaudler RP-6 Filler Saves Money

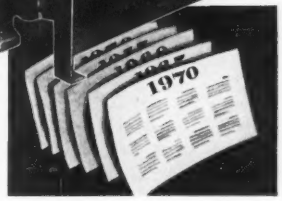
3 ways





ELIMINATES WASTE. Amount of fill can be adjusted to an accuracy of 1/10 of an ounce. Perfect synchronization prevents costly spillage.



QUICK, EASY CLEANING. Pistons and valves quickly disassembled without tools. All product contact parts stainless steel or copper free nickel alloy.

ECONOMICAL LONG LIFE. No piston rings or connecting rods and wrist pins to wear out. Forced grease lubrication to all moving parts. Automatic take up on valves.

For average production speeds, the Pfaudler RP-6 Filler delivers sanitary, accurately filled containers at the lowest operating cost. You eliminate many of the hidden costs that may now be chipping away at your profits—spillage, frequent maintenance with consequent loss of production, parts replacement, costly cleaning time.

The RP-6 is a six-pocket filler operating normally at 150 containers per minute. Filling speeds up to 200 containers per minute are possible with some products and certain containers.

Mail the coupon below for your copy of Bulletin 876, "Rotary Piston Fillers." It contains valuable information on how to reduce your filling costs.

Pfaudler

THE PFAUDLER CO., ROCHESTER 3, NEW YORK
Engineers and Fabricators of Food Processing Equipment

Gravity Fillers · Piston Fillers · Steam Peelers · Deaerators · Vacuum Pans · Evaporators

THE PFAUDLER CO., Dept. FE-12, Rochester 3, N. Y.
Send me the facts about Pfaudler Piston Fillers right away.

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

The cold facts behind Swift's Premium Ham

Swift & Company—long famous for its hams, as well as its other Swift's Premium branded products—keeps things cold with Worthington compressors in its plants at Chicago, Cleveland, Sioux City, St. Joseph, Mo., Georgetown, Del., Mishawaka, Ind., Philadelphia and Jersey City.

Other big meat-packing names who also use Worthington refrigeration equipment are: Armour, Wilson, Morrell, Hormel, and Miller & Hart.

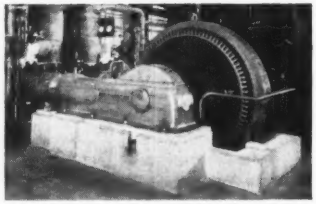
When you call on Worthington for your refrigeration needs, you're assured of the equipment that exactly suits your needs—thanks to the completeness of the Worthington line and its over 100 years' experience with liquid- and gas-handling equipment.

Worthington ammonia compressors, used throughout the meat-packing industry, are available in capacities of 1 to 1,000 tons in *vertical*, *Y* or *horizontal* types. All use Worthington's exclusive Feather* Valves and offer many other features representing the most advanced design in the field.

No other manufacturer makes so complete a line. A Worthington system is all Worthington-*made*, not just Worthington-assembled, for perfect balance in operation and unit responsibility.

Worthington Corporation, Air Conditioning and Refrigeration Division, Harrison, New Jersey.

*Reg. U. S. Pat. Off.



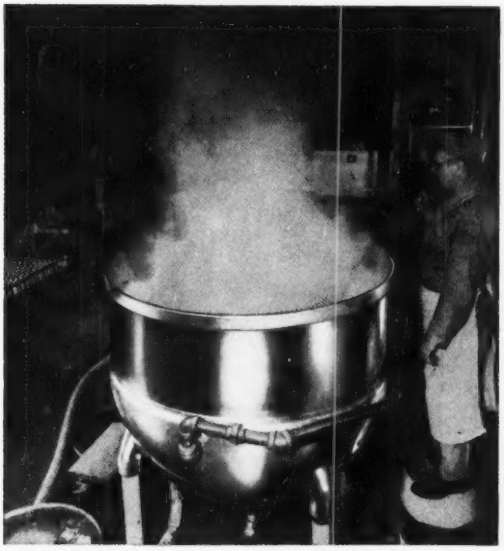
WORTHINGTON horizontal duplex ammonia compressor at Swift & Company's plant in Chicago. A-2-13

WORTHINGTON

Air Conditioning and Refrigeration

When equipment must handle a variety of products, you can't beat easy-to-clean STAINLESS STEEL

——says this Chicago food firm



This Stainless Steel Groen steam-jacketed kettle operates on an intermittent schedule in processing preserves, jellies, dessert powders and sauces in B. A. Railton's Manufacturing Dept.

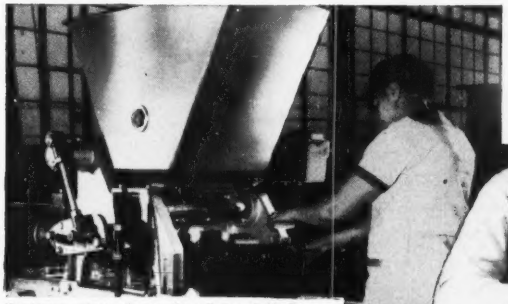
● Smaller processing plants, where equipment is called upon to handle products so varied that there are seldom two identical batches in succession, have found a simple solution to the problem of contamination by carryover. A liberal use of Stainless Steel equipment provides the answer.

Typical is the experience of B. A. Railton Company, one of the largest strictly institutional wholesale grocery firms in Chicago. Its Manufacturing Department processes and packs a line of pickles, preserves, jellies, sauces, spices, marmalades and mayonnaise for its institutional trade.

Stainless equipment here includes two 350-gallon steam-jacketed kettles; a filler with Stainless hopper, valves and measuring cyclinder, and vacuum-type bottle filler with Stainless filler heads and conveyor chain.

Leo Hass, Superintendent of Railton's Manufacturing Department, points out that, with Stainless equipment, a change of run requires little more than hosing down with boiling water. The dense, hard surface of Stainless Steel will not pit, consequently there are no cavities to make elimination of carryover more difficult. Fruit acids do not contaminate Stainless, and, highly important, Stainless lasts four or five times as long as other equipment.

No matter what food products you process, these benefits of Stainless Steel are important. And to obtain finest performance from your Stainless equipment, be sure that your fabricator uses service-tested U·S·S Stainless Steel.



The hopper, valves and measuring cylinders of this Geyer filler are Stainless Steel.

Inspecting the first run of dessert powder from the Groen kettle are John D. Senne (left), Vice President of B. A. Railton, and Leo Hass, Superintendent of the Manufacturing Dept.

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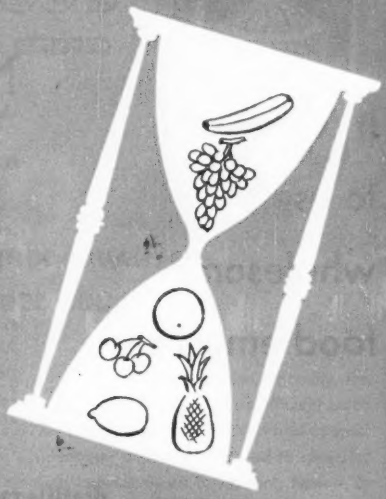

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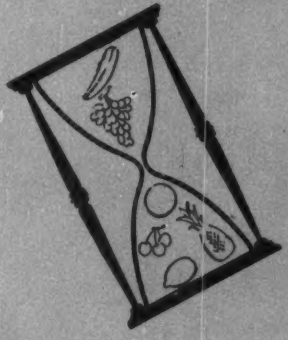

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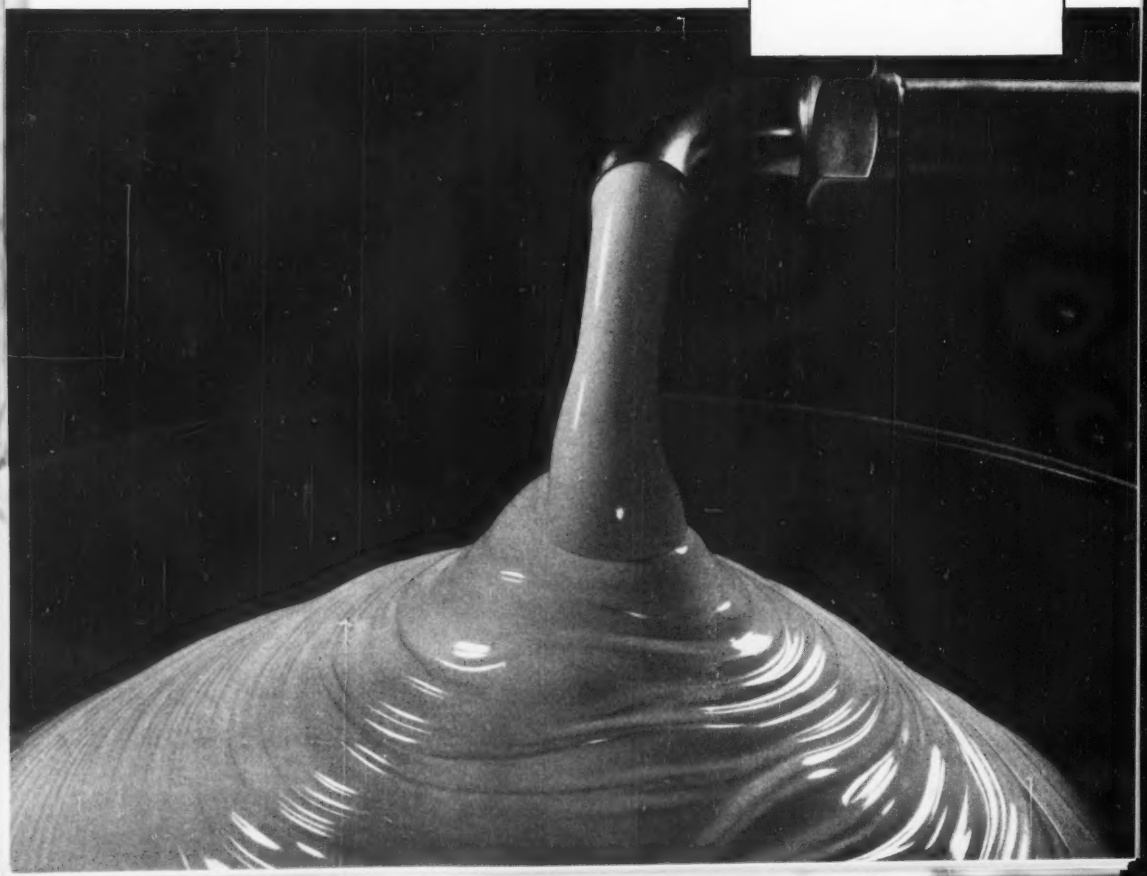

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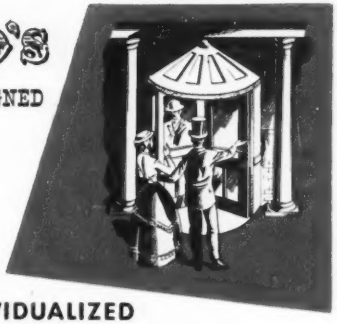
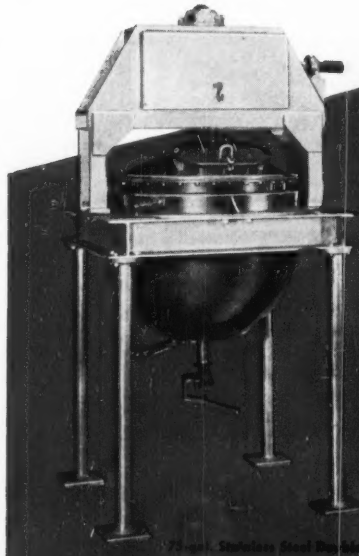


Koven

WAS MAKING INDIVIDUALIZED

FOOD EQUIPMENT



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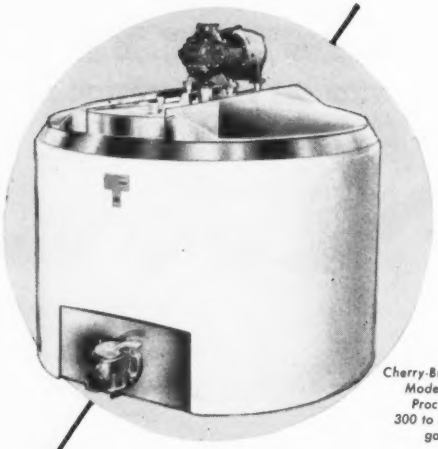

Cherry-Burrell Model WP Processor 300 to 1000 gallons

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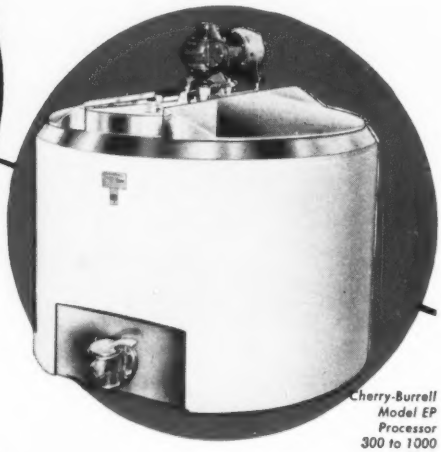
is the only heavy-duty vat available today that heats with steam or re-circulated hot water and cools by direct expansion. A self-contained direct expansion combination cold wall and pump spray cooler. Your best choice for low temperature cooling when refrigerated water is not available.



Cherry-Burrell Model EP Processor 300 to 1000 gallons

MODEL EP PROCESSOR

has enclosed pressure channels on sides and bottom for fast heating with steam or hot water and cooling with re-circulated water or sweet water. Zone control available. Your best bet for low temperature cooling when refrigerated water is available.

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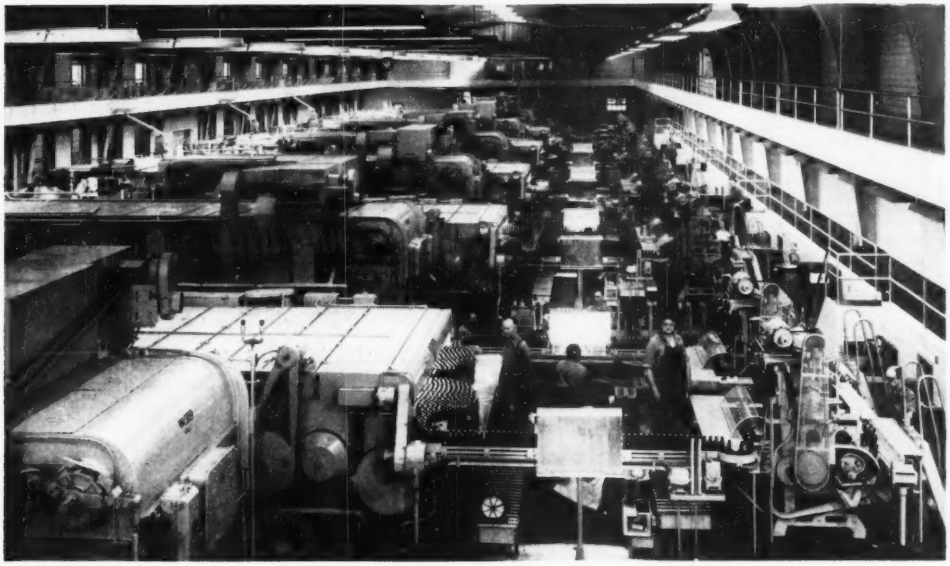


OVERALL VIEW. Bottling room is outstanding for its clear span, permitting efficient U-shaped arrangement of equipment. Absence of columns and piping makes for highest operating performance. Note visitors' balcony.

New Bottling Plant Incorporates

Six Engineering Advances

Applicable in other food branches, new facilities installed by Detroit brewer speed trucking, up sanitation, ease maintenance, increase efficiency, safety

F. W. McCARTHY
Assistant Editor, "Food Engineering"

Teaming of a number of advanced engineering features has won efficiency, economy, and high sanitation at the new bottling plant of the Stroh Brewing Co., Detroit.

These are the notable six: (1) Adequate space and facilities for handling uninterrupted truck traffic; (2) installation of saw-tooth docks equipped with telescopic conveyors; (3) a clear span, multi-line, bottling room incorporating efficient ventilating and heating arrangements; (4) isolated washer legs for better plant sanitation; (5) automatic equipment-trouble spotters; and (6) safety in handling caustic soda, also broken glass. **And all six are adaptable by other food plants.**

Stroh's management worked with Harley, Ellington & Day, Detroit architectural and engineering firm to clinch the improvements. Fact that Stroh and these architects had solved expansion problems together in previous years—back in the 'teens and also in the mid '30s—lent experience in speeding the new program to completion.

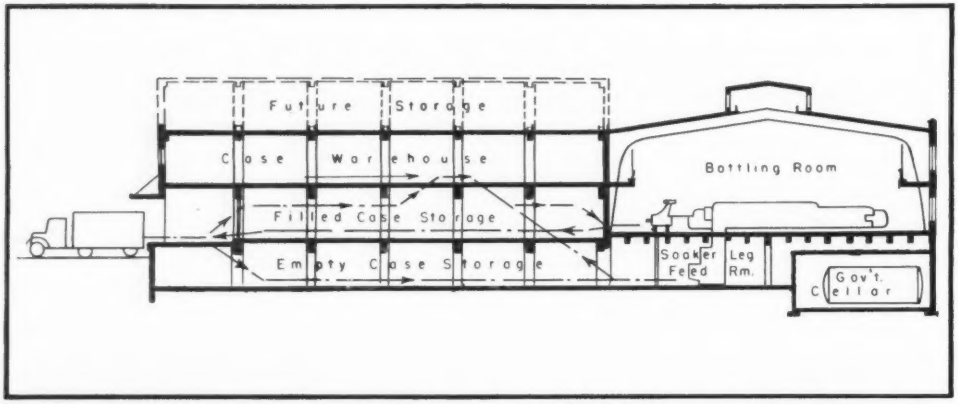
Acquires Public Street

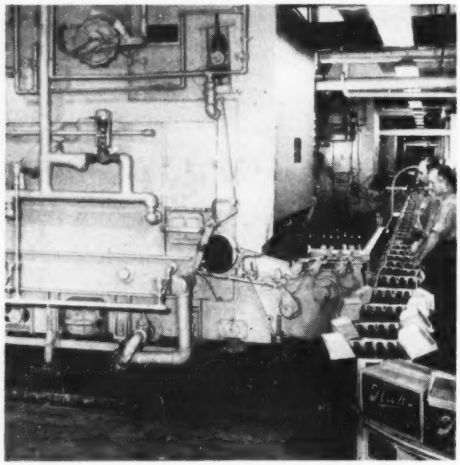
We will now detail the advances in order. To provide adequate area for the new plant and efficient traffic handling, the brewery was able to acquire a public street from the city. Thus the site is presently bounded by a narrow alley on the north, active streets on the east and west, and the balance of their own plant is to the south.

The property will eventually be fenced and traffic enter from the east, where adequate parking space is provided for trucks, if waiting is necessary. From this area, trucks are assigned to a particular dock. Here they are loaded and unloaded without additional movement. When loaded, trucks then continue west past the control watchman and through the gates to city traffic.

Flow of traffic, a major item in operating efficiency, had a direct bearing on the general plan of the building. Hence, the bottling room was placed along the alley to the north, with the warehousing to the south.

How Cases Are Handled





SHORTCUTS are accented in movements of filled and empty cases. Flow through plant is diagrammed at top. Left photo: Telescopic conveyors accelerate loading and unloading. Right photo: Washer legs are in basement, improving sanitation.

Then in order to provide sufficient depth to the warehouse and also maximum space for truck maneuverability, a saw-tooth dock was used. This arrangement allowed a distance of approximately 55 ft. from the extreme corner of the dock to the opposite brewhouse wall, a sufficient space for efficient operation of trucks.

Further, the saw-tooth docks are located adjacent to the driver's check-in room in the main office. This traffic flow within the brewery's own premises provides excellent control and eliminates any confusion in the public streets due to maneuvering of trucks or their waiting for available dock space. Service docks are in turn located at the east end of the building. Here supplies such as carton material, crowns, labels, and soda are received, and baled paper, and debris are discharged.

Uses Telescopic Conveyors

The saw-tooth docks comprise nine recesses, each of which is equipped with an Alvey telescopic conveyor unit having a boom that "follows" the load. The unit can be extended into the truck bed a distance of 20 ft., and it is regulated from pushbuttons mounted on the side at the foremost end of the boom. It also has a hazard-prevention feature. For, on the forward face of the extending section there is a safety switch that automatically shuts off the unit on contact with an operator or other obstruction.

The case carrier part of the unit—a double flat chain—is reversible. It can thus be used for both loading and unloading without moving the trucks from their original position. This is accomplished by having the telescopic unit common to both the loading and unloading systems. The empty-case conveyor is located beneath the loaded-case line, and a hinged, short-section roller conveyor, which is raised or lowered, serves to "switch in" the outgoing loaded-case conveyor from above.

Boom Height Adjustable

The boom conveyors were designed especially for this plant. Due to the wide variation in the height of truck platforms, the outboard end of each boom conveyor has been designed so that it can be mechanically moved up

or down to conveniently suit the type of truck being serviced. The movement range of the boom is such that variations from 27 to 54 in. in truck platform height above the pavement can be handled. Regulation of boom height is also via pushbuttons conveniently located for the operator. Use of the extending conveyors eliminates carrying cartons (empty/loaded) from one end of the truck or trailer to the other and materially speeds and eases this operation.

A catwalk extends the entire length of the loading dock, and stairs leading down to various truck-platform levels make all truck locations readily accessible to shipping clerks and checkers. Both the full and empty carton conveyors pass beneath this catwalk. Empty-case conveyors are housed-in, both for fire protection and to protect the mechanical carton counters from the elements.

Empty return cartons travel from the dock via decline belts to the basement storage area. Each truck has an individual line leading through this area, and these lines are arranged in groups which eventually discharge onto an accumulating conveyor loop. Surplus cases not required at the soakers are taken off and placed in storage. The loop acts as a surge tank or reservoir to keep the soakers supplied with empty bottles. Three chain conveyor loops complete the transit of bottles to the six bottle washers.

This conveyor-system layout is tied into other advanced engineering features in this plant. For it minimizes case conveyors in the bottling room, and thus improves the general appearance, ups sanitation, and lowers maintenance and cleaning costs. Case conveyors in the bottling room are limited to two short runs of approximately 25 ft. each per bottling line. Both conveyors are located about 1 ft. above the floor. They enter and leave via portholes in the side walls. One line delivers empties to the caser, the second takes away the full cases.

Clear Span Employed

This bottling room incorporates a number of other engineering advances: It is 88 ft. wide, 350 ft. long, and has a clear, uninterrupted floor space. Employed are 17 structural steel, rigid-frame girders. Lightweight, precast concrete slabs are used above. A continuous monitor roof runs the entire length of the room and provides natural light and ventilation.

Materials of construction used in this room were chosen primarily for their sanitary features. They are termed both durable and impervious, and they also present a pleasing appearance. General wall construction consists of off-white ceramic glazed tile with green glazed trim. Aluminum has been used for double hung sash and balcony handrails. Windows are equipped with slate sills in which is incorporated a condensation gutter connected to the drainage system.

A minimum of vapor and condensation is a feature of this room, but the gutters are provided to remove excess condensation from the window glass during extreme winter conditions. Acid and caustic-proof quarry tile floors are used throughout this room, except for the concrete of the base and curbs for the soakers and pasteurizers. This concrete has been treated with a vinyl resin compound to balk disintegration and provide a waterproof surface.

The clear span permitted a highly efficient equipment arrangement and provided simplified maintenance and cleaning. Elimination of columns, piping, electric conduit, and major conveyor equipment all adds to improved sanitation, also provides unobstructed access and passage around equipment.

Equipment Layout U-Shaped

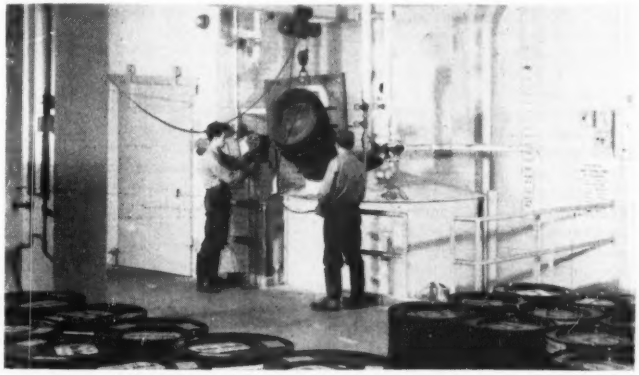
Piping, conduits and mechanical service to the bottling units are installed below the bottling floor slab and provide a very efficient hook-up. The absence of columns, case conveyors, and other obstructions in the bottling room, led to the conception of the foldback or U-shaped equipment arrangement with basement soaker legs. This set up has shortened the lengths of bottle conveyors and reduced the number of corner turns, thus minimizing bottle breakage hazards. The bottle conveyor from the washer, through the filler and into the pasteurizer is one continuous chain, synchronized with those operations. Efficiency of the bottling units is termed higher than 90 percent, and the yield from the beginning has been 13.6-plus cases per barrel.

Coming out of the pasteurizer, the bottles are diverted in both directions feeding two labelers. This take-away conveyor from the pasteurizer can also be run in either direction. In the event one of the labelers needs attention, all bottles can be diverted to the other while the first is being corrected. This flexibility avoids necessity of stopping production or leaving some bottles in the pasteurizer for too long a period, thus affecting quality.

Installation, at each end of the pasteurizer, of a unique automatic unscrambler, comprised of a vibrating plate and cable arrangement, has added even greater flexibility to the operation of the pasteurizer. In case of a slow down ahead, this device allows bottles to continue leaving the pasteurizer proper as per scheduled time, thereby protecting product quality. Bottles build up on a shelf provided for this purpose. Then when the take-away conveyor is re-started, the unscrambler automatically goes to work on the accumulated group.

Access to each bottling line is provided via a lower balcony along the south wall. A visitors' balcony completely circumscribes the bottling room at the second floor level. From this level crowns are dropped to the fillers via hoppers extending out from the balcony at the location of each bottling line. Chutes from the hoppers lead direct to the fillers. Along the north gallery, a plate glass guard, sloped at a 45 deg. angle from floor level, provides protection, from any object falling from above, for the equipment or personnel below, and without obstructing the view.

(Turn to page 173)



CAUSTIC HANDLING is safe. Guarded mixing area and use of mechanical carrier simplify these operations, minimize hazards.

Balking *Algae* In Beverage Water

Quick to cause flake-like sedimentation, musty odors, and "wildness," these spoilers are persistent. Hence, thorough preventive steps are required—with the water, the equipment, and the bottles—to make sure they're put to rout

NINO F. INSALATA
Chief Bacteriologist, White Rock Corp., Brooklyn, N. Y.

Here's a "word of wisdom" to the bottler: Don't perfunctorily discount algae's menace to your bottled product—for these organisms can render your drink unsaleable just as surely as does yeast spoilage.

When algae have found their way in, there is ready evidence in the form of suspended particles of flocculent, white organic matter, usually of a viable and reproductive nature. These particles are flake-like and/or filamentous in appearance, and they generally form minute clumps or colonies that settle to the bottom of the bottle.

While the natural color associated with algae is green or bluish green, the organisms are seldom found in the finished beverage in this hue, unless raw or untreated water has been used. Presence of minute amounts of chlorine may be enough to rupture the chloroplasts (color producing bodies) and oxidize the pigments.

What appears as a white flake to the naked eye, however, is often revealed by miscroscopy to be a reproductive algae colony containing chlorophyll and capable of contaminating a beverage. Upon uncrowning a bottle of drink containing these flakes, "wildness"—loss of beverage content and carbonation—generally results. Usually, there are musty odors due to the metabolic activities of the organisms.

For the above reasons, every possible process precaution and sanitizing procedure should be employed to prevent introduction of algae into the carbonated beverage.

Furthermore, water users in other branches of the food industry—where incursions of algae are possible—might well "follow along" here as we detail the methods of curbing these organisms.

Types Encountered

Several species of algae are readily noticed in natural waters. These possess many identical physical and metabolic characteristics, but some produce different colors and shapes by which they may be recognized. The most common algae are:

1. Chlorophyceae—green algae
2. Cyanophyceae—blue green
3. Phaeophyceae—brown
4. Rhodophyceae—red
5. Chrysophyceae—acid
6. Microcystis Flos-Aquae—large, circular, flake-like
7. Microcystis Aeruginosa—small, ovoid, clustered.

These organisms are not equipped for locomotion, but are usually carried from one site to another on currents of moving water. Their ability to sustain themselves under ordinarily unfavorable environmental conditions makes them particularly difficult to remove from an infected water-treating system.

Algae may become fragmented to such minute sizes as to be undetected by the eye, and they are then capable of passing through many of the industrial filters used today to contaminate a product which may be "sterile" in every other respect.

In the Finished Product

Methods by which algae contaminate a plant and enter the finished product are many. Basically, however, prime source of contamination arises from the raw, untreated water brought into the plant.

If no treating equipment is used, the algae-laden water is carried directly through the crude filters, cooler, carbonator, and filler valves, and then into the final product. Needless to say, all units of plant equipment coming in contact with this water become infected and are then possible foci of recontamination.

In those plants where inadequate water-treatment measures are employed, such as the use of only a sand bed, carbon bed, and paper or cloth polisher, particular care must be employed to avoid contaminating these closed units.

It is rash for a bottler to assume that microorganisms ranging in size from 1 to 5 microns, can be retained by a sand and carbon filter bed. The sand bed could only curb the very largest masses of colonies and would permit all others to pass through. The carbon bed would aid in the partial removal of odors and gases present due to the algae, but it would in no way retain or destroy them. The paper or cloth polisher might retain particles of sand or carbon, but viable and reproductive algae spores are far smaller in size and are capable of passing through the filter and into the apparatus.

The paradox to this situation may be found in the bottling plant that is completely equipped with chlorine or chlorine dioxide generators to purify the incoming water. Seemingly, all that can be done is being done here to overcome infections from raw water in the finished product. But one major source of trouble has been overlooked—the raw water (algae laden) used in the final-rinse compartment of the soaker.

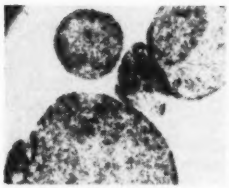
In spite of proper temperatures and caustic percents, it is not possible to deliver a sterile bottle if raw, untreated water is employed as a final rinse. A 28-oz. bottle retains approximately 4 drops of rinse water after it has passed through the final compartment of the soaker. Assuming that the raw, untreated water used for this rinse is only moderately laden with algae, this 28-oz. bottle could contain approximately 6,000 organic particles.

It is small wonder that flocculent matter and wildness are so often characteristics of a finished beverage. Other areas of recontamination are: The cooler, carbonator, filler, and even the syruper valves which have come in contact with raw water. Syrup room tanks, hoses, valves, and other apparatus, have also been known to become foci of algae infections.

Shelf-Life Conditions

Once a viable and reproductive algae cell or colony has found its way into the filled bottle, it is subject to the

Water-User's Handy Key to 24 Common Algae (Mag. 350X)

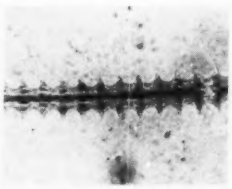

MICROCYSTIS FLOS-AQUAE

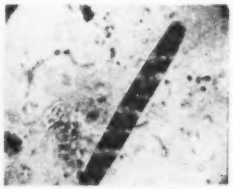
CLOSTERIUM

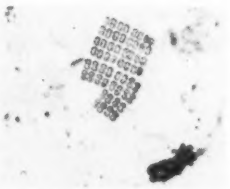
TABELLARIA FLOCCULOSA

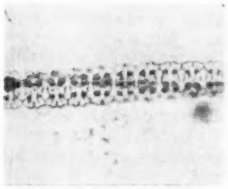
STAURASTRUM OPHIURA

PINNULARIA

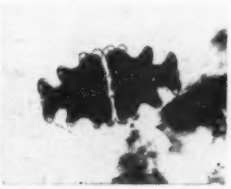

TRIPLOCERAS GRACILE

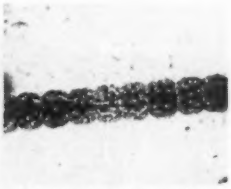

SPIROTAENIA CONDENSATA


MERISMOPEDIA ELEGANS

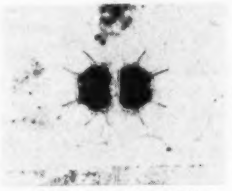

DESMIDIUM APTOGONUM

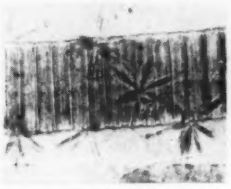
PLEUROTAENIUM

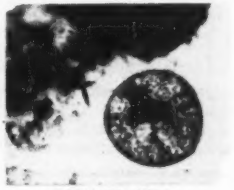

EUASTRUM PINNATUM

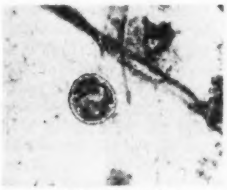

DESMIDIUM QUADRATUM

ARTHRODESMUS CONVERGENS

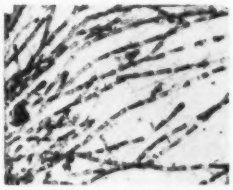

XANTHIDIUM CRISTATUM


FRAGILARIA


EREMOSPHAERA


ACTINOPHRYS SOL

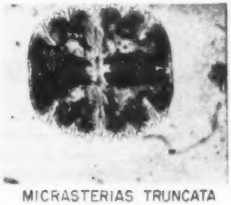
NAVICULA


BULBOCHAETE

MICRASTERIAS DENTICULATA

STENTOR VIRIDIS

MICROCYSTIS AERUGINOSA


MICRASTERIAS TRUNCATA

DESMIDIUM DEPAUPERATA

environmental conditions that determine the shelf-life of the product. However, there are certain physical conditions which favor algae growth. The organisms prefer sparkling water, or other drinks containing salt solutions, over all other beverages. But they will survive in almost any carbonated beverage.

Degree of carbonation is not a primary factor, inasmuch as the organisms require only 48 hr. to colonize. Moderately warm to hot temperatures aid algae growth. However, these organisms have been known to exist in the frozen arctic as well as in hot springs in all parts of the world.

The greatest single factor aiding and stimulating their growth and reproduction is sunlight, which is utilized in photosynthesis, a process by which the metabolic faculties of organisms containing chlorophyll produce food for the agent.

Suggested Treating Systems

Proper choice of a water treating system is important in overcoming chronic algae contaminations. Their removal should be in two steps: (1) Chemical treatment with such algaecides as chlorine or chlorine dioxide, and (2) physical removal of the organic fragments and debris that result. One step—either chemical or physical—without the other, will not accomplish complete purification; for while chlorine will destroy algae it may not remove the organic fragments that are capable of producing the floc-like appearance and/or wildness in the product.

Those bottlers who are fortunate enough to have a water source that is chemically balanced, and that does not require chemical treatment, could use a chlorine dioxide system having an oxidation rate approximately 2.5 times that of chlorine. This system (made by Proportioneer's, Inc., Providence, R. I.) utilizes diatomaceous earth filters under hydraulic pressure to remove organic particles approximately 0.1 microns in size. Experiences have lead us to conclude that this system, if properly operated, is one of the best available for such problems as algae control.

For those bottlers with water that requires softening or other chemical balancing, we have found the continuous flocculation system is desirable. In this process, all chemical treatment is accomplished at the same time chlorine is added as the algaecidal agent. Suspended organic matter and other unwanted elements are flocculated and the clear supernatant water is drawn from the top of the accelator.

Both the chlorine dioxide and continuous flocculation systems have retention tanks (to allow proper time for complete oxidation of impurities), sand filters, carbon beds for chlorine removal, and paper and/or cloth water polishers.

An important aspect to be remembered here is that, in either system, provisions should be made to pump chlorinated water from the unit into the final rinse compartment of the soaker. A concentration of 8-10 ppm. chlorine, or its equivalent in chlorine dioxide, should be maintained here under a pressure of not less than 40-50 psi.

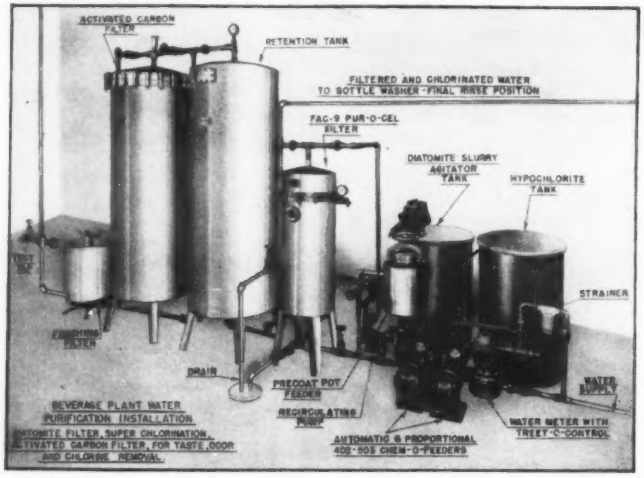
The chlorine will completely sterilize the bottles after they have been properly sanitized in the soaker. At the concentrations suggested, no chlorine taste, bleaching, or other unfavorable condition will arise.

Overcoming Algae In the Plant

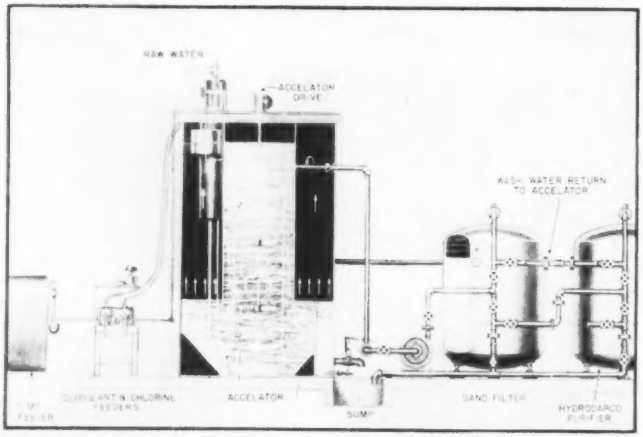
Since the bottling operation is continuous, the product moves from one step to the next—and so do the algae, until every piece of equipment is in-

(Turn to page 197)

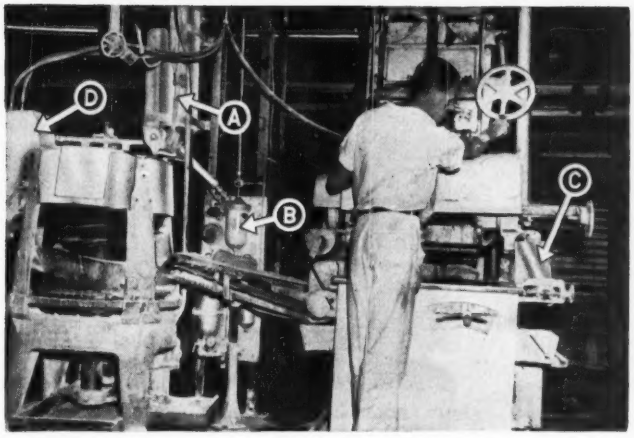
Conditions of Water Dictate Extent of Treatment

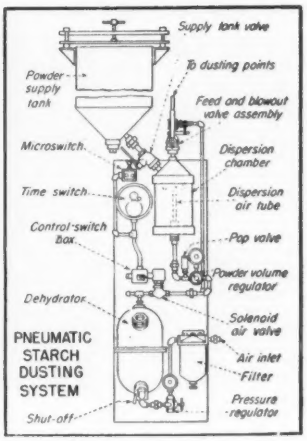

ACTIVATED CARBON FILTER
RETENTION TANK
FILTERED AND CHLORINATED WATER TO BOTTLE WASHER - FINAL RINSE POSITION
FAC-9 PUR-O-GEL FILTER
DIATOMITE SLURRY AGITATOR TANK
HYPOCHLORITE TANK
STRAINER
DRAIN
PRECOAT POT FEEDER
RECIRCULATING PUMP
WATER METER WITH TREET-O-CONTROL
BEVERAGE PLANT WATER PURIFICATION INSTALLATION
DIATOMITE FILTER, SUPER CHLORINATION, ACTIVATED CARBON FILTER, FOR TASTE, ODOR AND CHLORINE REMOVAL
AUTOMATIC & PROPORTIONAL 402-503 CHEM-O-FEEDERS

CHLORINE DIOXIDE system is one of best for algae control in water not needing chemical treatment. Cl_2O_2 is automatically metered into tap water, which is then filtered through diatomaceous earth and activated carbon to remove organic particles and Cl. (Proportioneers, Inc., photo.)



CONTINUOUS FLOCCULATION system is desirable when water requires softening as well as purification. Here, chemical treatment and chlorination are carried out simultaneously. Suspended matter is flocculated, and clear water is drawn from top of accelator. (Infilco Inc., photo.)





OPERATION of new system for starch-dusting doughs as they travel through make-up units. Photo: Starch is intermittently fed from bin (A) to dispersion chamber (B), where cloud of fine dust is formed and carried to application points—(C) at dough divider and (D) at rounder. Diagram shows the working details.

Cures Dough-Dusting Troubles

By employing efficient, sanitary pneumatic system, New York City bread baker curbs dust, simplifies clean-ups, and saves some 1,500 bags of dusting materials annually . . . And use of starch stops insect infestation

FE STAFF

Mechanical dusting of flour on doughs while they are in transit in the make-up department has been giving bakers a lot of gray hairs.

Particularly, it has created insanitary conditions. For the flour accumulates throughout the area, not only giving an untidy appearance but also setting up a prime breeding ground for insects.

But this double-headed problem has now been licked: A new technique—pneumatic dusting—keeps such accumulations of materials to a minimum. And infestation has been curbed by discontinuing the use of flour and doing the dusting with starch, which does not support insects.

According to B. S. Budny, general manager, and Arthur Neubauer, plant superintendent, of Gottfried Baking Co., New York City, where this advanced system was first installed, there are several very noteworthy attendant benefits—

Clean-ups sped: These have been greatly simplified due to the minimum amounts of starch gathering on the floor and in the machines. For example, only some 3 lb. of starch—instead of 200 lb. as with flour—pile up at each end of the overhead proofer during a 24 hr. period. And the unit itself need only be cleaned every 6 weeks (rather than weekly), since the starch build-up inside runs a mere 6 lb. or so in 7 days as against several hundred pounds with flour.

Materials conserved: Considerable savings have been realized on dusting material. The amount required each week has been reduced from 36 bags of flour to but 8 of starch—an annual saving of 1,456 bags of dusting material.

Space saved: Less floor room is required in the make-up department for storing the smaller amounts of dusting material now employed.

Performance improved: Operations at the divider, rounder, sheeter, and molder are now much smoother. And despite hot, humid conditions, there are no "stick-ups" in the proofer, for the doughs are now always well coated.

Quality raised: Better loaves of bread are now turned out. Crusts are thinner, more tender, and richer in color. Also, cores and swirls inside the loaves have been practically eliminated.

Labor cut: Operators at the divider and molder now have more time to check-weigh dough pieces to obtain greater uniformity in the final weight of the loaves.

There's another advantage, too, that bears promise: Respiratory illnesses attributed to dusty conditions may no longer be a problem.

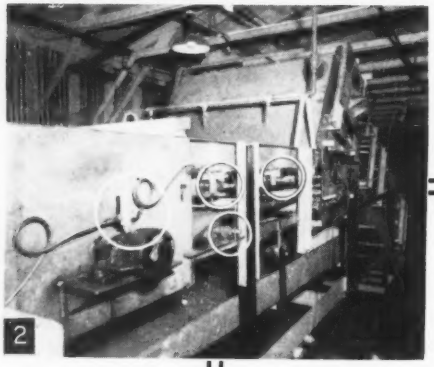
At Gottfried's, five different types of doughs are pneumatically starch-

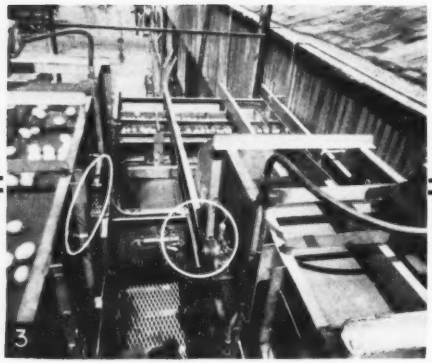
(Turn to page 194)

. . . And Pies, Cakes, Biscuits, and Candy

Excellent possibilities are seen for this new system in starch dusting pie doughs, sweet doughs for Danish and coffee cakes, and biscuits on their way to the oven. Also, confectioners might well look into its use for dusting cast marshmallows and grained, pulled mints.

Lube Oil Is Piped To . . .





FRUIT PROCESSING PLANT'S system automatically dispenses oil to bearings and moving parts. Photo 1 shows a periodic servicing, by portable electric pump, of one of the seven central pipeline lubrication stations. Thus system is recharged with oil at 2,700 psi. And copper tubing (¼-in. dia.) routes lubricant to metering valves (indicated in Photos 2 & 3) which supply bearing points along endless-belt conveyors both inside and outside plant.

CENTRALIZED

Saves Time and Costs

► It eliminates contamination due to excess hand lubrication and spillage
► Reduces a complex, full-time lubing chore to a 1 man-hour-per-day operation
► Saves on lubricants, minimizes equipment maintenance, cuts down-time

FE STAFF

Intense seasonal activity and 24-hr. operation have made programmed equipment lubrication a vital part of food engineering.

But setting-up such a program sometimes becomes a dual engineering-technological problem. This is especially apparent in fresh fruit product manufacture, where conventional heat sterilization often is eliminated in process.

Because of this lack of heat treatment in newly developed processes, it has become necessary to establish equally new concepts of sanitation. More frequent wash down and much larger quantities of wash water are being used. And in-plant chlorination plus periodic steam-gun cleaning are established techniques.

Such intensive sanitation rapidly removes all lubricants —especially in that vital part of the process where incoming fruit is graded, washed, chlorinated, and juice extracted.

Exchange Lemon Products Co., a pioneer in fresh fruit juice freezing, has successfully solved this operational problem at its Corona, Calif., plant (see photos) with a centralized lubrication system that is periodically meshed with sanitation. Employing an Alemite lubricant-feeding network serving 4,500 points, the system is credited with these major benefits:

A brief look at the process, equipment involved, and its sanitary requirements quickly indicates why this planned system of lubrication was needed.

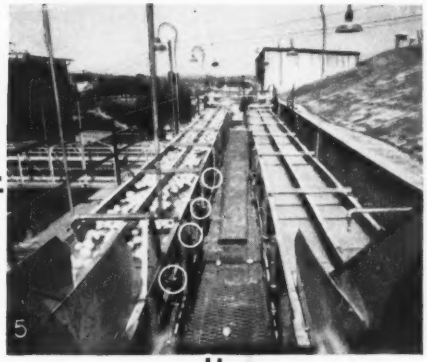
Essentially, the Corona plant converts surplus packing-house lemons—trucked in from the affiliated Sunkist operation—to a Sunkist unpasturized fresh-frozen juice. To minimize bacterial build-up in process, an intense sanitizing schedule is maintained. Besides this there are detailed samplings and laboratory control to select fruit suitable for juice.

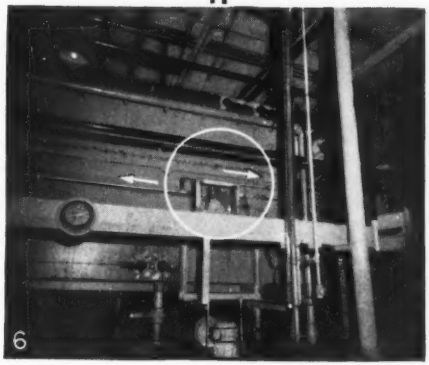
When in operation, much of the processing is under almost continuous chlorine water spray and frequent complete washdowns and steamings are routine. Actually, 4 hr. of clean-up are scheduled in every 24-hr. period.

Multiplicity of Bearings

Transfer of fruit between grading, sizing, washing, and juicing operations involves hundreds of feet of endless-belt conveyors. And spotted every 4 ft. to keep these belts moving are powered rollers having bearings at each end. Appetite of these bearings for oil is high—for the chlorine sprays, located at intervals to keep the conveyor wet and sterile, inadvertently wash away bearing oil.

The same problem is encountered in powered grading,





IN-STREAM SANITATION, such as by chlorine sprays seen mounted over conveyors in Photos 4 & 5, quickly washes away lubricant. But piped lubrication (indicated) permits instant re-oiling of the many score remote points on long outside conveyors. Photo 6: Moving machinery parts are also pipe-lubricated with a fine atomized oil developed by this centrally located "Oil Mist" station. Flow is through pipes as shown by arrows.

LUBRICATION

Also Boosts Sanitation

sizing, and washing units, where almost continuously wet conditions have the effect of delubricating bearings and moving parts during operation.

From grading, the washed fruit travels up an outside inclined conveyor over 200 ft. long and with bearings about every 3 ft. Since this conveying elevator is a double affair, it would require an arduous bit of climbing to manually take care of its 200-plus lubricating points. A chlorine spray is also located at the feed end of this unit.

A horizontal distributing conveyor—also chlorine-spray equipped—routes the elevated fruit into a second floor burring room where juice is extracted. Four sizes of fruit can be handled by this endless belt system. It is over 60 ft. long and involves more than 150 lubricating points.

Seven conveyors in the burring room distribute the fruit to 26 juice extracting units. All of these movers are of the endless-belt type, the upper belt serving as main conveyor and the lower one transporting surplus fruit. Total length of conveyors in the area is 450 ft. Each is equipped with belt rollers spaced—both top and bottom—at 4 ft. intervals.

In all, these many conveyor bearings, plus several score chain and moving-part locations, total up to 4,500 distinct lubricating points throughout the plant.

How Lubrication Is Piped

To deal with this multiplicity of lubrication points—many of which are in straight-line runs as long as 100 ft.—it was decided to "pipe" oil to all locations much as conventional utilities (steam, water, etc.) are routed to process equipment. A series of "Accumeter" valves were then installed to replace oil cups and other lubricating fittings, and these were connected in groups by runs of $\frac{1}{8}$ in. copper tubing.

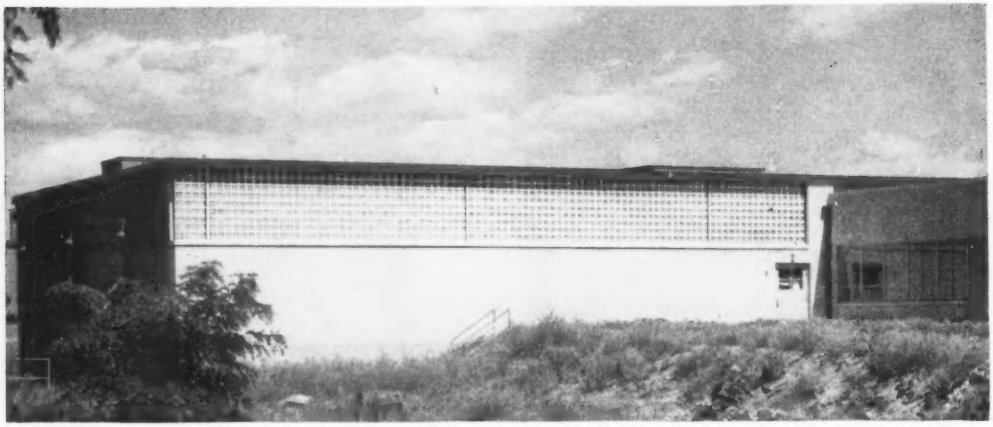
Essentially, the lubricating valve is set up for automatic dispensing of a measured amount of lubricant to a bearing whenever its piping network system is placed under pressure. This valve contains a spring operated plunger that normally keeps the valve body closed to oil supply when pressure is at atmosphere.

However, when pressure is exerted into the tube system this spring is forced back to provide entry of oil into its body cavity, and at the same time access to the bearing is sealed off. Then, when pressure is released, the valve returns to normal position and its enclosed lubricant is forced into the bearing by spring pressure.

To pressurize the system a portable electric piston type pump is hooked up to a central point and run until an indicator at the inlet valve advises that system pressure has built up to the desired 2,700 psi. A handle at the valve is then turned to the "off" position, which releases pressure with subsequent discharge of lubricant into all bearings on the line.

Because oil distribution is totally enclosed it is, in effect, a "barrel to bearing" system and thus protects against any

(*Turn to page 201*)



FUNCTIONALLY DESIGNED, new brick-and-glass-block plant matches the advanced processing facilities inside. The

New Continuous Plant Pays Off

One-story macaroni factory is laid out for straight-through processing,

JOHN V. ZIEMBA

Assistant Editor, "Food Engineering"

Straight-line efficient production and advanced sanitation form the basis of design for the new one-story macaroni plant of A. Zerega's Son's, Inc.,* at Fair Lawn, N. J. Back of this design are the company's efforts to process uniform quality products on continuous lines.

Studies by Frank L. Zerega, president, and A. Z. Vermylen, plant manager, confirmed the fact that better products could be consistently obtained on uninterrupted production lines under tailored operating conditions. Accordingly, special attention was given to advanced features in planning the pace-setting Jersey plant. Result is a most modern facility—in high contrast to the old multi-story Brooklyn building.

Installed to improve quality and sanitation, increase efficiency, and lower costs were: (1) A sanitary pneumatic conveyor system for bulk handling of semolina and flours, (2) continuous macaroni presses for long and short goods, (3) high-volume dough-sheet formers for noodles, (4) automatic macaroni spreaders, (5) straight-through dryers, (6) a variety of efficient packaging lines, and (7) special company-designed cutting and feeding units for the many macaroni products.

* This firm was founded 104 yr. ago by Antoine Zerega, a pioneer of the macaroni industry in the U. S. A.

Factors for the Future

To provide for future expansion and to prevent any break in straightline production, two factors remained uppermost in the minds of company planners: First, sufficient space was allowed in the present production department for future addition of five extra lines to the five now operating. Second, the west wall of the building was constructed in such manner that it may be readily removed; thus, the boiler room, now located in this area, may later be dropped below floor level to permit extension in this direction of production and receiving-shipping facilities.

The new plant occupies 5 acres of an 18-acre plot. Exterior of the building is constructed of red brick. Interior walls throughout process areas are of smooth-surfaced, easy-to-clean white Keene cement. Nothing in the manufacturing department is painted (except some pieces of purchased equipment), hence surface-cover peeling is no problem here. Further, there are no floor drains, where water might accumulate and support the growth of microorganisms. Steam, hot water, and other lines are off the floor. So, too, are pumps and tanks. Bases of all equipment are cemented to the floor to eliminate under-areas that might harbor infestation.

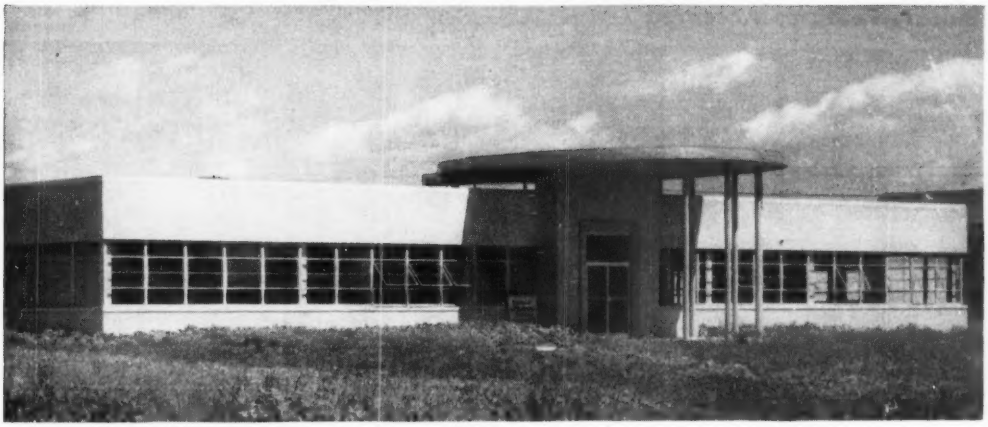
In summer, compressor water is pumped onto the roof to a depth of 2 to 3 in. This water gradually evaporates and keeps the plant 6 to 7 deg. F. cooler.

Better Lighting, Sanitation

Deep panels of glass block extend around the building to flood production areas with easy-vision daylight—even on cloudy days. Meanwhile outside distractions are shut out. Workers enjoy the advantages of the natural light even though their stations are removed from exterior walls. This helps them to turn out products of uniform color—one of the quality-control measures.

These translucent blocks occupy approximately 40 percent of the exterior walls about the production areas. They simplify window maintenance and protect the plant from outside dirt. No blinds or shades are required, and the panels of glass block need cleaning only twice a year—instead of every month, as was the case with ordinary plate glass windows in the firm's former plant in Brooklyn. Clear glass windows and screens set in the glass block panels provide ventilation.

These blocks reduce the formation of condensation—a problem which is



dividends are notably accelerated performance in production of first-quality goods. (Kimble Glass Co. photograph)

In Efficiency, Quality, Sanitation

using advanced, easily cleaned handling units . . . Can be simply expanded

typical of macaroni plants, where there are a considerable number of drying operations. No longer are there damp walls and puddles of water on floors. Since these panels are built flush to the inside walls, window sills, that invite accumulations of dust, are eliminated.

Panels of glass block were selected for still another reason—to insulate the plant against outside temperature changes. They have the insulating property of an 8-in. brick or 12-in. concrete wall.

Advantages of Bulk Handling

Company planners gave top priority to techniques of advanced materials handling, resulting in a change to fluent bulk methods. To handle the large volume of semolina and flours needed to operate the five lines most efficiently, Fuller Airveyor equipment was installed. Now, one man operates the entire system—a push of a button moving semolina, under about 10 in. of vacuum, from box car to storage bin and then to use or press hoppers at a rate of 10 tons hourly. Only manual labor required is emptying bags of semolina into a dump hopper.

Use of this system has also considerably improved labor relations, since most of the objectionable material-handling and clean-up chores have been eliminated. No longer is it necessary to disassemble, clean, and reassemble long runs of screw conveyors and bucket elevators.

The new system was also selected for sanitary reasons. It is free from the possibility of insect infestation. All pneumatic conveying circuits are fully self-scouring. And they are completely sealed to prevent escape of flour dust into plant areas. Surfaces not subjected to high-velocity self-scouring action are finished with stainless steel. There are no pockets where semolina can lodge and eventually become infested. Moreover, pipe joints have been specially machined to eliminate cracks and crevices.

Only portion of the system requiring screw conveyors is where the feeders discharge semolina from storage bins. However, these units have been designed so that it takes but a jiffy to drop the bottoms for cleaning with a high-pressure air hose.

DON'T SKIP IT IF—

You have problems involving:

Increasing Production
Streamlining of Handling
Improving Sanitation
Continuous Dehydration
Plant and Process Layout
Work-Area Lighting
Building Construction
Planned Expansion for Future

For this article discloses advanced practices that can be used to profit by other branches of the industry.

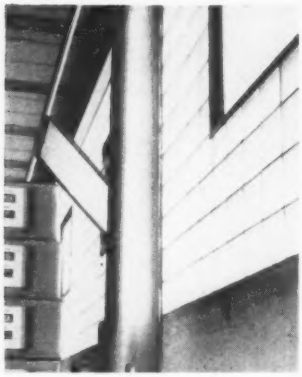
How System Operates

Bags of semolina are opened in a box car and emptied into a portable stainless steel dump hopper. As the man dumping the bags clears the car, he pulls the hopper along to eliminate any extra steps to the car door. Provision has also been made to unload a GATX Trans-Flo car, should such bulk shipment be feasible in the future.

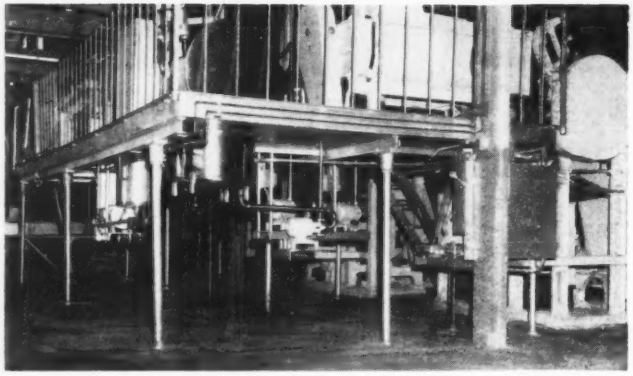
Semolina is now drawn through 6-in. dia. flexible and stationary pipes to a bag-type filter, which separates the flour from the conveying air and discharges it through a rotary air-lock into a vibrating sifter. Next, it is fed into a conveying line for distribution to four 40,000-lb. capacity storage bins with conical bottoms and clean-out boots. Constructed of flush-welded steel, each bin has a seamless interior.

From these bins, semolina is discharged into 4-ft. long horizontal worm-screw conveyors. These are manually adjusted to deliver any ratio of raw material (to make a blend) into a suction line that again pulls it into the bag filter. Sifting is repeated, and the semolina is blown into any of the

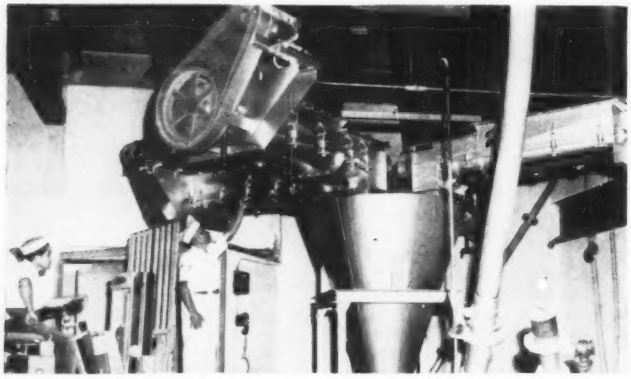
Sanitary Features Accented



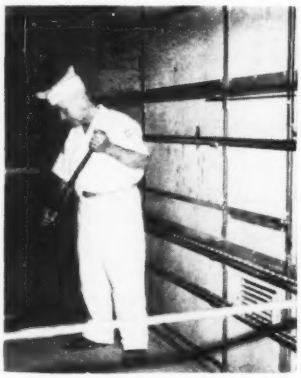
PANELS of glass block abolish old window sills that collect dust and other material.



NOODLE PREPARATION is carried out on elevated platform. With this neat arrangement, cleanup operations are facilitated. Mixing and holding tanks, pumps, and pipes are well off the floor.



THESE conveyors discharge semolina from storage bins, are easy to take apart and clean. System is self-scouring.



DRYERS are of sanitary construction, are cleaned at end of operations.

Long Goods Are Packaged Two Ways

ON THIS LINE, macaroni is fed onto U-boards that are then machine-wrapped in laminated cellophane.

HERE, macaroni is weighed and packed into cartons, which go to automatic gluing and sealing machine.

five 20,000-lb. capacity use bins located directly over the macaroni presses. Syntron vibrators at the bottom of these bins prevent any flour build-up.

Heart of the distribution setup is a multi-way "switching station" in the pneumatic conveyor system that permits feeding of the semolina into any of nine bins—four storage and five use bins. Pipes serving the bins are grouped so that anyone can be easily connected by flexible hose to the delivery line. There are also future provisions for putting in extra storage bins (2) and additional use bins (5).

All bins are equipped with high- and low-level indicators connected to a control panel. When a bin is full, a red light appears on the panel, a horn sounds, and the flow of semolina stops. Low level indicators flash amber lights to warn the operator when bins are empty.

Air carrying the semolina is removed from each bin by a return line. Using butterfly valves, the air is drawn only from the bin being filled. This return air is then pulled into a separate filter with a turbo-exhauster. Any dust or material entrained in the return line is fed to the blowing line to prevent loss of semolina.

Continuous Presses

Uniform quality products are continuously processed on five lines—two for long goods, one for short items, and two for noodles.

Production on each line handling long goods is about 800 lb. per hr. Each line—from extrusion press to the end of the continuous dryers—is 220 ft. long.

Buhler and Consolidated presses are employed. Into each unit semolina and water are fed. In a stainless steel chamber, a slowly revolving agitator kneads the material into a dough of the proper consistency, feeding it at the same time to the extruder. Dough, forced under pressure through dies, emerges as long strands.

Machine-feeding of long goods onto 54-in. drying sticks is accomplished with automatic Consolidated spreaders. An electric timing device alternately feeds the sticks onto two roller chains. Feeding of the sticks can be regulated from one every second to one every 2 min. Each stick is pushed against the center of a row of extruded macaroni. The timer then actuates knives that cut the strands to length. Cut strands now drop over the stick, which is carried to the extension arms of the spreader. An automatic trimmer now evens up the ends of the macaroni. A limit switch on each end of a chain conveyor then automatically sends the sticks of macaroni or spaghetti into the preliminary dryer.

Significant product-handling innovation for long goods is the installation of continuous preliminary (40 ft.), intermediate (60 ft.), and final (60 ft.) dryers. Goods make three passes in the preliminary dryer and five passes through the other two. The sticks of macaroni or spaghetti are chain-belt conveyed through the dryers on a zig-zag course. Drying takes 30-36 hr., depending upon the product. Continuous dryers were developed by Clermont Machine Co.

There are six 18-in. horizontal fans in the preliminary dryer and 24 in the intermediate unit. The final dryer is equipped with eight 72-in. vertical fans. Also, hygrostatically controlled blowers (18 in.) regulate the moisture of the air entering the dryers.

Temperatures in the dryers, which are equipped with steam coils, are thermostatically controlled. Condensate from the steam line is returned to a trap and then pumped back to the boilers. All pipes, pumps, and steam traps are located outside of the dryers and a sufficient distance above the floor to facilitate clean-up operations.

Of course, the temperatures and relative humidities maintained in the dryers vary with the product being handled. Generally, they are 105 deg. F. and 95 percent, respectively, in the preliminary dryer, and 95-98 deg. F. and 92-95 percent in the intermediate unit. In the three-stage final dryer, they are 95 deg. F. and 90 percent (1st stage), 92 deg. F. and 87 percent (2nd stage), and 90 deg. F. and 85 percent (3rd stage).

Moisture-laden air discharged from the dryers is picked up by ducts of three large exhaust fans and carried to the outside of the building. Though adjacent to the dryers, the ducts are not hooked up directly with them, hence do not interfere with their operation.

The dryers are constructed of Celotex, insulating board faced on both sides with a smooth coating of Transite. This surface promotes cleanliness, requires no painting, and is not subject to hair-line cracks—a common source of infestation. The dryers are also verminproof. Sides of the dryers are level with the floor, and Plexiglas windows are used as a safety precaution.

Long macaroni products are cut to remove the U-shaped portion (formed when the fresh goods from the press are loaded onto sticks) and thus make a neat, tight package. The macaroni is lifted from the sticks and placed on a belt conveyor going to a 3-bladed guillotine knife. Cut to desired lengths, it then goes into 40-lb. capacity trays, ready for packaging.

Short Goods Press

Output on the continuous short goods line is about 1,100 lb. an hr. Semolina and water are automatically fed into the mixing chamber of a Buhler press, where an agitator kneads them into a dough of the proper consistency. A rotating knife then cuts the macaroni coming from the extruder, and the product drops onto a Clermont shaker-type dryer that is equipped with four staggered, horizontal screens.

This press is also used to manufacture egg-type short goods. Here, egg solution, prepared in the noodle department, is piped to a 50-gal. stainless tank, from which it is pumped to a 1-gal. trough directly over the press. This system continually circulates the solution to keep the egg solids in suspension. Level of the solution in the trough is float-controlled, and the flow to the press is pre-set by a valve.

A ¾-in. stainless steel pipe carrying egg solution from the noodle department is supported by two inverted angle irons, which are suspended from the ceiling by iron frames. With this arrangement, it is easy for the maintenance crew to dismantle the pipe for cleaning purposes.

A flight conveyor now carries the macaroni to the preliminary dryer. Traveling on wire-mesh conveyors, the product makes nine passes through this unit. Macaroni is next carried by a flight conveyor to the intermediate dryer, where it makes five passes. Seven passes are made in the final dryer. Attached to this unit is a tachometer for automatically controlling the speed of the belts through all dryers. Drying takes about 18 hr.

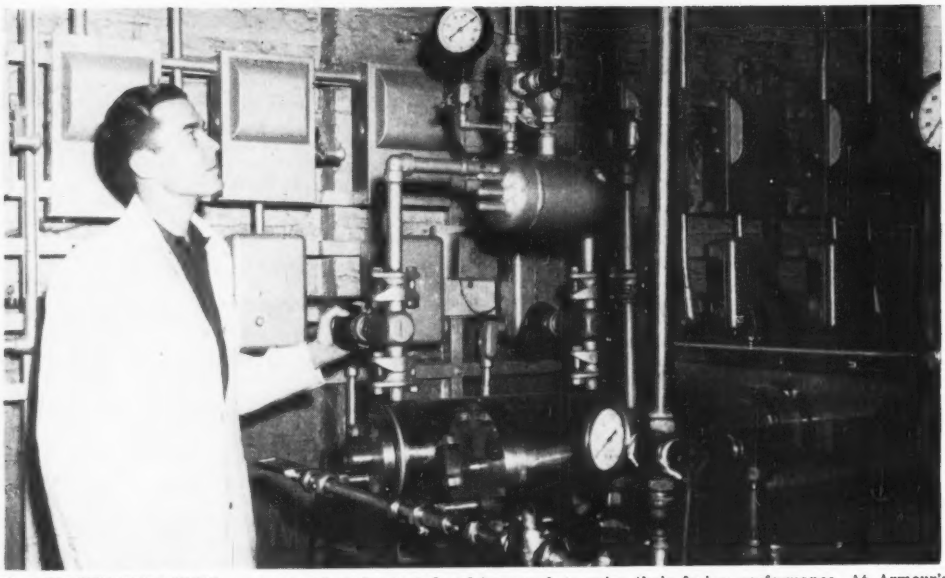
Fast Noodle Line

Preparation of ingredients going to the continuous Clermont dough-sheet forming machine is carried out on a platform supported 4 ft. above the floor by 2-in. dia. pipes. Thus, it is easy to keep the floor in this area sanitary as well as free from congestion. The 100-gal. capacity stainless steel mixing and holding tanks are set in so

(*Turn to page 172*)

Triple-Line Closeups

Zerega's new highly engineered short goods, long goods, and noodle lines that transformed the former complicated multi-story production into the present efficient, continuous, one-floor operation is graphically detailed in this month's special FE Foldout Picture-Flowsheet—on pages 134-137.



THE SHORTENINGS USED are constantly being tested and improved to raise their frying performance. At Armour's refinery pilot plant (above), Votator mixer heat-exchanger is used to study plasticizing methods.

6-Factor Control Assures

Quality Deep Fat-Fried Foods

Here are practical measures that will quickly lay the bogies of fat hydrolysis, polymerization, instability, discoloration, foreign matter, and off-flavor—and cut process costs, too

R. W. BATES
Assistant Director of Development, Research Division, Armour and Company, Chicago

When put to protracted use in deep-fat frying operations, shortenings finally change their composition and accumulate impurities to such an extent that they must be replaced.

Exactly how long a shortening should be used depends upon its type and condition, the cooking temperature, operating factors, effectiveness of filtration, and whether there has been contact with certain metals.

Primarily, shortenings are employed in deep-fat frying as a heat-transfer medium. They also add valuable nutritive properties and flavor to the products fried.

To produce quality fried foods, a notable half dozen changes occurring in fats or shortenings during deep-fat frying must be controlled. They are: (1) Hydrolysis, (2) polymerization, (3) stability, (4) discoloration, (5) foreign material, and (6) flavor.

Each controllable reaction will be taken up in turn:

1—Fat Splitting

► Hydrolysis involves the splitting of a fat—when reacting with escaping steam—into its component fatty acids and glycerol.

The degree of hydrolysis may be measured by determining the free fatty acid content of the fat.[1] When delivered, most commercial shortenings contain less than 0.10 percent free fatty acid.

At the start of a frying operation, the fat or shortening begins to hydrolyze and, in a very short time, the free fatty acid content increases. Normally, volatilization of the free fatty acid and the addition of new fat will keep the free fatty acid content at equilibrium. This value is usually under 1 percent. In some operations, however, it may reach or exceed 5 percent, which is extremely undesirable.

The smoke point of a shortening is inversely proportional to its free fatty acid content. A high free fatty acid value causes excessive smoking.

Reaction of fatty acids with metal materials used in the construction of equipment is especially notable in the case of copper and black iron. The acids dissolve the metal which, in

turn, catalyzes or accelerates hydrolysis. The dissolved metal also accentuates the adverse effect of other basic deteriorative factors.

Free fatty acids themselves tend to discolor readily. Hence if they are present in sufficiently high concentrations, they may discolor shortening.

It may be pointed out that there is little, if any, difference in the tendency of shortenings to hydrolyze.

Hydrolysis is a function of frying temperature as well as time and degree of contact with the steam bubble. Lascaray's data[2] are roughly indicative of the effect of frying temperature upon fat splitting. In determining how long it took to free 50 percent of the fatty acids in tallow with 60 percent water and 0.5 percent sodium hydroxide at different temperatures, he found that it took: 0.5 hr. at 428 deg. F., 0.9 hr. at 392F., 2.2 hr. at 365F., 4.2 hr. at 338F., and 9.0 hr. at 302F.

From these figures, it is apparent that the splitting of fat at 365 deg. F. takes 2½ times as long as at 392 deg. F., under these conditions.

In controlling free fatty acid content, vapor pressure of the acid or its tendency to volatilize must be considered. Pool and Ralston[3] showed that the vapor pressure of palmitic acid varied at different temperatures. It was 72 mm. at 500 deg. F., 25 mm. at 450 F., 7.4 mm. at 400 F., and 1.8 mm. at 350F.

By increasing the temperature from 350 to 400 deg. F., the rate of volatilization of palmitic acid is three times as fast. Other fatty acids such as stearic, oleic, and linoleic would be expected to respond similarly.

It is obvious, therefore, that an optimum frying temperature should be used whereby a minimum of hydrolysis will occur with a maximum of volatilization. In general, this temperature is very close to 375 deg. F. The optimum temperature, however, will also be dependent upon other factors, such as the material being fried, its moisture content, retention time in the frying unit, fat absorbed by the fried material, metals of construction, and the like.

Some inhibition of hydrolysis seems possible with surface active agents. Thus the actual time of contact of the fat with the escaping steam bubbles is decreased. Here again, a delicate balance must be achieved—for decreasing the time of contact with steam bubbles may inhibit volatilization of the free fatty acids inasmuch as the steam tends to carry them off.

2—Multi-Molecule Fats

▶ Polymerization is essentially an inter-reaction of fat molecules with one another. Also oxidation of the fat can occur.

Normally, in deep-fat frying operations, there is a combination of these two.

Polymerized fat has a higher viscosity than new fat. In case of extreme polymerization, the fat may, at lower temperatures, be syrupy.

Chemically, the degree of polymerization may be measured by the decrease in iodine value, which is a gage of unsaturation of a fat.[1] Shortenings with high iodine values tend to polymerize more readily than those with lower ones. It is always desirable to harden a heavy-duty frying fat as much as possible. This hardening must, of course, be limited by reasonable plasticity requirements both for handling purposes and for the sake of the appearance of the finished product.

To date, there are no known additives for inhibiting polymerization that meet edibility requirements. On the other hand, accelerators of polymerization are numerous, such as certain metals and metallic salts.

Keeping the metallic content of the fat low in deep-fat frying operations is very desirable, since the tendency toward polymerization will then decrease. This may be achieved by controlling hydrolysis and by the use of such metals of construction (those to be in contact with the fat) as No. 304 or 316 stainless steel. It is also important that the metal content of the fresh shortening be low.

The use of markedly polymerized fat for edible purposes cannot be recommended. And if polymerization is not controllable in any other way, there should be frequent changes of shortening in the system. There is little evidence that fatty acids alone are less nutritious as when combined with glycerol. But there have been some reports of impairment of the nutritive value of fats which are polymerized.[4]

3—Keeping Quality

▶ Stability of shortening is quite important in deep-fat frying. Normally, fats do not become rancid during frying, but their stability in the finished fried goods makes for longer shelf life of the product.

It is always desirable to use a high-stability fat for continuous deep-fat frying, since the stability of all shortenings markedly decreases with use. The same factors that were covered on polymerization apply to oxidative changes, which decrease stability. The end result of these changes may be a rancid, inedible product.

It is recognized that there are inherent differences in shortenings, and accordingly some resist oxidative changes better than others.

The AOS (active oxygen stability) test is roughly indicative of a fat's resistance to oxidation. However, conditions of operation, principally metallic contamination and exposure to air, markedly affect this property during actual use. Most processors of fried foods desire a shortening of over 100-hr. stability AOM (active oxygen method) for heavy duty operations.

4—Darkening of Fats

▶ Discoloration of the fat, as discussed previously, ties in rather closely with hydrolysis.

Usually color of used fats is measured by the Lovibond system, employing a column depth of 1¼ in. Here, the color is expressed in yellow and red units or, preferably, by comparing it with the Fat Analysis Committee AOCS (American Oil Chemists' Society) color standards.[1] The fat must be filtered, otherwise suspended material will interfere with the test.

With all operating factors identical, one shortening will tend to darken just as much as another. Furthermore, the initial color of shortenings is about the same within narrow limits and in no way indicative of color stability.

5—Objectionable Suspended Matter

▶ Accumulation of foreign material is undesirable in any fat-frying operation.

Charred food particles and extraneous material adversely affect the

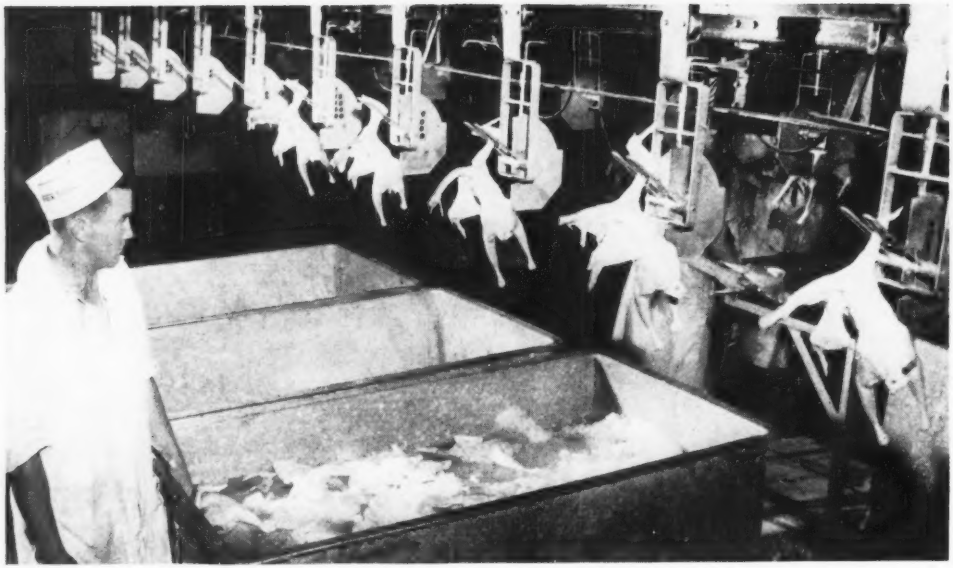
(Turn to page 160)

Working Tips for the Processor

Within recent years, there has been a very rapid increase in commercial deep-fat frying of foods—such as ready-to-serve doughnuts, potato chips, the new frozen French fries, and the breaded, deep-fried seafoods.

Accordingly, the larger fried-food companies have steadily raised their demands for shortenings until they are using several tons daily in each plant—which makes it more pertinent than ever that there be sage recognition of the many factors affecting the use of these materials.

Hence, our spotlighting here of the major causes of fat deterioration—to aid the processor in his control of deep-fat frying and thus clinch both economy and highest quality in their finished products.—*R.W.B.*



AUTOMATIC SIZER involves automatic conveyor scales that trip various size chickens into different chill tanks at end of eviscerating line. This is typical of advanced practices in the plant.

Ties Plant to Business Tides

Fox teams merchandising and engineering in the planning stage—setting up a poultry operation profitably keyed to the trends. Feature is departmental production with expansion-oriented layout. Unit efficiency gets the accent

HAROLD M. WILLIAMS
Vice-President, Fox DeLuxe Foods, Inc., Chicago

In planning the layout and construction of an "ideal" broiler processing plant, a first requisite is that the food engineer and architect understand supply and market dynamics as well as the company's long-range merchandising policy.

This primary consideration very much influenced the planning that led to Fox DeLuxe Foods' new Dardanelle, Ark., plant—placed in operation this past spring. And to approach optimum performance, meshing prevailing market vagaries with efficient production, a high degree of flexibility was built into the operation.

Stress was put on unit processing to "departmentalize" output . . . Radial layout to permit easy central quality and supervisory control . . . Planned geography that favors growth with small change or down-time . . . Suspended-trough feeding batteries which speed a varied throughput of product.

Before evaluating these and other in-plant operations, however, let's get back to our basic planning and the restraining influence that a realistic merchandising outlook placed on straight engineering-type thinking.

First, it's obvious that a poultry plant will only be as successful as its ability to fill the purpose for which it is constructed. Features of a plant may be good for one company but poor for another. The plant approaches perfection only insofar as its use helps fulfill long-run company objectives.

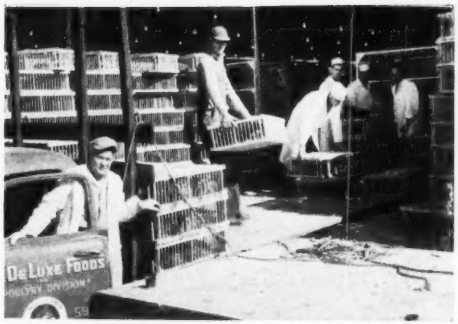
With this in mind, searching questions must be asked before planning can begin. Does the company aim to devote merchandising efforts to frozen-fresh fryers, or does it intend to sell fresh ice-packed poultry? The processing of each requires different layout and equipment.

Is the company going to promote an advertised brand? If so, will it not want to stress quality control over cost of production? Will the company tend to more complete cut-up and packaging at the processing level —this in line with the trend to self-service? If so, won't excess space (excess according to present needs) be necessary? And will it be the company's policy to put up many different items and cuts, or will it aim at a few standard packs?

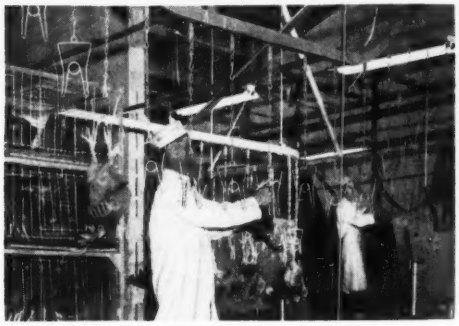
Planning at Marketing Level

Thus, the initial step in plant layout is an exact understanding of future company policy in merchandising. From this it follows that good marketing depends upon good production, and vice versa—the success of one depending upon the success of the other. And the ultimate overall success will depend upon mutual understanding between the different departments.

As late as 1939, over 95 percent of



UNLOADING is speeded by unique dock comprised of jutting piers. Empty crates can be piled on docks.



BIRD SHACKLING is systematized. First man hangs two, skips every other shackle. Second man fills skips.

LIVE CHICKENS initially go into steel battery (capacity, 128 birds) divided into 16 compartments.

the broilers grown in Arkansas were raised in the first six months of the year (hence the name "spring chickens"). However, broilers are now available the year 'round. Last year, our two Arkansas plants operated 50 weeks out of the year, and many other plants followed a similar pattern.

But while the broiler-growing field has largely been de-seasonalized, there is still much to be accomplished in stabilizing production. Widely fluctuating prices have had devastating effect on the growers. Low live prices with resultant out-of-the-pocket losses discourage production, so some growers drop out for the next round. Ten or twelve weeks later—the time needed to grow chickens—a scarcity raises price enough to discourage consumption.

Flexibility an Objective

Unfortunately, the above vicious cycle appears to feed on and thus perpetuate itself. For example, within the three months preceding this writing we have had variations in live prices from 29c. to 18c.

To fit into this turbulent market environment, our company decided on a long-range marketing policy to give stability to our selling program and prices. And we planned on coupling this with a production system that had enough flexibility to meet each unpredictable, changing situation as it developed.

Adjusting the price of fresh ice-packed chickens alone is not the answer—as we are finding out. Fresh chickens have to be moved within the week, and the consuming market will temporarily absorb only so much.

No, price alone is not the answer. To quote a well-known economist*: "It is essential to cut price to move a standing surplus of what has already been created. Price is a means of rectifying fortuitous scarcity and unplanned excess. *It is a crude means of correcting accidents and mistakes after they have occurred.*"

So our first step was to add facilities for frozen-fresh cut-up chickens and chicken parts. By working overtime, or by working both sides of the eviscerating tables when the live market is low and reducing operations when the live market is high, we can help stabilize the pricing system at both ends.

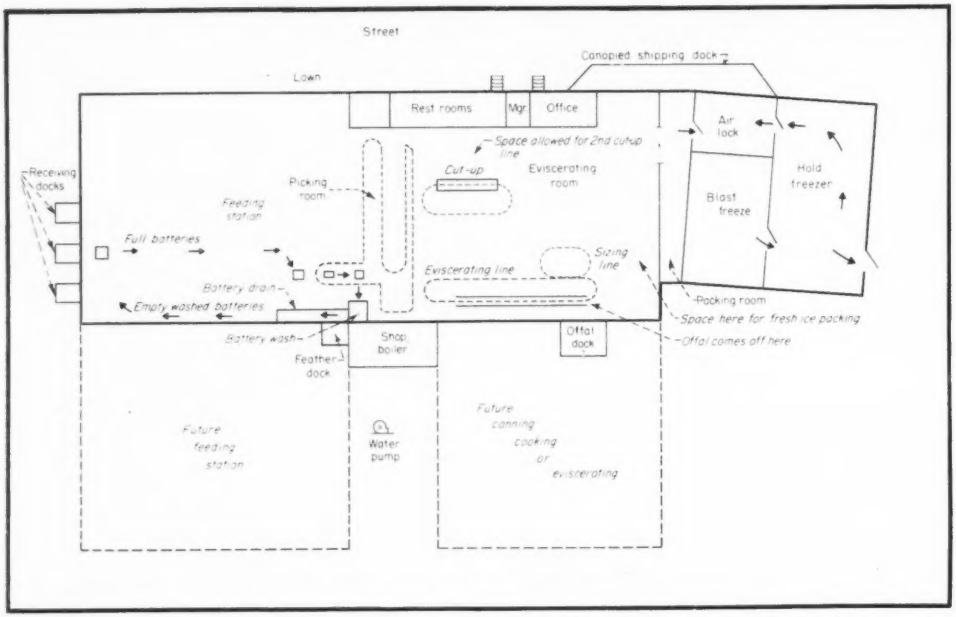
Since frozen-fresh poultry can, under proper conditions, be kept as long as six months, frozen production can serve as an adjuster in fresh ice-pack production. The former process does not require the exact synchronization of operations that fresh handling demands. So if necessary, we can stop or ease up on ice-pack production and fill current orders out of freezer stock. And by the same token we can process quantities far in excess of current orders.

Thus, the processing of frozen poultry becomes a double-acting cushion by temporarily eliminating the exacting element of time.

Our second planning step involved addition of canning facilities to the new plant. Because of its keeping quality, canned poultry can be processed when desired. If, for example, no orders are on hand for ice-packed poultry and an adequate supply of frozen product is in stock, then the eviscerating and cut-up crews can cook, bone, and can chicken.

Because of the large amount of

*Norman J. Silberling, in *The Dynamics of Business.*



PLANT LAYOUT depicts locations of various processing units. Live birds enter at left, pass through feeding station, then killing, eviscerating, and packing rooms and on to freezer. Shipping dock is just off packing room.

labor required per unit of canned, boned chicken — and the high percentage increase in product value—a relatively large number of employees can be gainfully occupied. This, of course, helps to keep the work force intact.

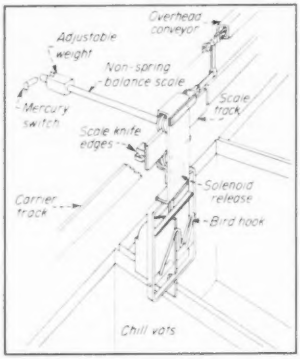
Stress Unit Operations

Many chicken processing plants have one continuous line for killing, picking, eviscerating, cut-up, and packaging. Engineering-wise, this is ideal, since it saves transfer operations from picking to eviscerating and from the latter point to cut-up. However, this arrangement renders the total operation much less flexible in controlling both labor and product—one operation cannot be executed without doing the next, and identical chickens must be processed all down the line.

Further—and this is important—the rate of output of any such continuous line is invariably set by its slowest unit.

To balance and coordinate activities throughout our new plant, we thought it advisable to break up operations wherever we could. With each separate unit operation more or less independent of the other (from the time standpoint) performance in each department can be more accurately gaged and bottlenecks at any point will then not suspend total activity.

If a certain size and grade of chicken is required for special packs, advantage of this broken-up operation is apparent. In even the best growing, you have a wide variation in the size of chickens. Cockerels average 20 to 30 percent greater weight than pullets, and variations also occur within the sex. Then, too, there is a grade variation — undergrades running at least 10 percent in average flocks.



ROBOT SIZER drops birds of different weights in proper vats. Track scale actuates solenoid to release bird from carrier. Scales in series effect various weight selections.

In our setup we have several points where we can size and grade chicken in conformity with the desired end pack. We start with a widely varying material and want to obtain many end products that demand uniformity in themselves, yet cater to varying consumer demands. By splitting up operations, each department can act independently at each level. Thus, we have the possibility of several alternate routes to permit "tailormade" production without too much sacrifice in the economics of overall production.

Let us brief some of these alternate process route possibilities. When chickens come in from brooder houses they can be sorted for size and condition in the feeding station—an opportunity denied those plants without this latter facility. Then, if we wish to pick more than we want to eviscerate, we simply speed up the picking line (an extra long scalder permits this) and transfer enough to eviscerating to keep this department busy, while backlogging the excess to New York dressed.

Terminating the eviscerating line, we have an Altenpohl automatic sizer which, through six robot conveyor scales, trips various sized chickens into chill tanks set up for various packs.

Automatic sizing is achieved in this manner:

As a poultry carrier moves along the overhead track, it passes onto a "floating" segment of track which actuates a scale balance. If the bird is within the weight limits for the designated size, a mercury switch is closed by the scale balance beam. This energizes a solenoid on the poultry carrier, which releases the bird into the cooling vat below. If the bird is outside the weight limits, the carrier passes to the next weighing station, and so on until it is dropped into its proper cooling vat.

We can thus eviscerate and temporarily put all the chickens into chill tanks in about (but not over) 30 hr. without running any poultry over the cut-up line.

Five Choices

At this point we have the following five alternates: (1) Selling everything fresh, ice packed; (2) selling part fresh, ice packed; (3) backlogging everything, eviscerated whole frozen; (4) cutting up the eviscerated product for backlog as frozen-fresh branded cut-up chickens and chicken parts; or (5) packing institution or bulk pack, and backlogging frozen.

If absolutely necessary, we could pick and eviscerate one day, shift the same crew to cut-up and packaging the next day, and operate with a skeleton crew to keep the plant going and retain a nucleus of personnel. If live chickens are unavailable, and we have a backlog of whole eviscerated chickens frozen, we could take the latter out of the freezer and cut them up—although this latter practice is not too desirable.

56 Work Movements Boiled to 3!

"Before adopting our new system of suspended trough hangers," says Author Williams, "we conducted a thorough analysis of the job—*and found we could save fully 53 separate movements, cutting the operation from 56 to 3.*

Here's the striking story:

Old Way

Used feeding troughs supported by 16 brackets attached to battery.

Separate Movements	Operation
8	. . . Push battery near a drain or tank to empty 8 water troughs.
8	. . . Pile 8 troughs (center trough set inside big trough) on a skid or on floor.
16	. . . Empty feed out of both ends of 8 troughs.
8	. . . Throw 8 long troughs on top of battery, where they ride until battery is refilled with birds and retroughed for feed and water.
16	. . . Fold back the 16 brackets inside battery to keep them from bending (these brackets at end of each trough do supporting, and battery compartment doors cannot be opened while troughs are held on battery).
56	**Movements, Total**

New Way

Employs suspended trough hangers which handle 4 large troughs or 12 separate compartments (4 by 3) as a one-man unit.

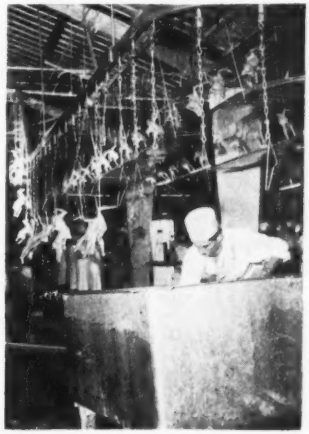
Separate Movements	Operation
2	. . . Detach hanger holding 4 water troughs by unfastening 2 snaps on upright from battery.
1	. . . Let hanger swing back in perpendicular position hanging about 1 ft. off floor.
3	**Movements, Total**

For an account of the numerous benefits thus won by Fox, see under "More Gains Scored," at end of accompanying article.

Further, if we had a small canning operation going we could keep our skeleton crew busy boning, canning, and cooking.

With the needed flexibility of operation well in mind during the planning, next step was design of a layout which would achieve this flexibility and still allow easy central control and possible expansion with a mini-

SANITATION is specially keynoted at eviscerating table, which incorporates two rows of pans to permit double operation. Viscera are inspected by U. S. veterinarian. Pit beneath table keeps water and grease off floor.



HANGING chilled, eviscerated birds on cutting-up line. Drainage is caught in suspended drip pans.

mum of changing and down-time. Let us follow the process flow in today's completed plant to see the result:

Live chickens are unloaded at the north end of our main building, a single story unit, 100 by 260 ft. long. They are put into steel batteries—steel cages 6¼ ft. high, 5 ft. long, and 3 ft. wide. Each battery holds 128 chickens in 16 compartments, with 8 door openings on each side.

Traveling on roller wheels, a full battery is pushed onto a floor scale located near the unloading dock. It is then run into position where the chickens are fed and watered for 36 to 48 hr.

When the birds are ready to be killed, the suspended trough hangers are unsnapped from the battery, swung back into plumb position, and the unit is pushed to the south end of the feeding station near the hanging line. At this point there is a second weighing, directly in line with the hanging loop, whereupon gross weight is marked on a card and the battery pushed into the hanging station.

Actually, the hanging setup consists of a conveyor track in the shape of a loop, with its end elevated enough to permit the battery to pass below. This makes for easy transfer of live chickens onto the moving shackles running on both sides.

The empty battery is then pushed directly ahead onto a third floor scale to get the tare so that feed gain can be computed. Then the unit is moved into the battery wash in the northwest corner of the picking room where, with a water pressure hose, one man is able to wash the affair in less than half the time it would take two men to scrape the 16 battery pans (which have caught the droppings).

Thoroughly washed, the battery is then rolled north along the west side of the feeding station, where water drips off into a 40-ft.-long sloped drain in the floor. The battery is then moved on to be near the loading dock ready for refill. This arrangement of scales permits a forward rotating traffic with no backtracking, crisscrossing, or blocking.

Weighing Pays Dividends

How does the above detailed procedure tie-in with our flexibility objective? And why all this weighing, involving a $3,000 investment in floor scales?

Let's first assume the need of a feeding station in order to have chickens always on hand to kill, and to put a better finish on each bird. Then why keep a separate record on the feed gain of each battery and each buying lot? Answer: Because this tabulated information aids in checking performance of the buyer and the pickup crew, and helps forestall unfair feeding practices by the grower involved. The accumulated data also facilitate stock control in the feeding station and gage effectiveness of station feed and feeder.

Finally, the net feed gain is an additional guide to management in measuring what the final eviscerated yield should be. It provides information necessary to profitable decisions as to pickup, buying, and feeding station practice—all vital and flexible factors of the overall operation.

Next, a look at the 100 ft. x 120 ft. long eviscerating room. This area is completely open and has only five steel supporting posts 20 ft. apart down the middle. The pinning, washing, eviscerating, sizing, and fresh ice packing are along three walls, leaving a clear space in front of the office and the central area wide open.

One large area with clear space, rather than two or three smaller rooms of equal floor area, offers a geometric increase in the number of operational layout possibilities. And the central free space permits wide circular movements of tanks or skids of chickens, instead of sluggish and difficult angular traffic around walls and through doors.

Easy Central Control

From his one-way office window, the plant manager has an unobstructed view of all operations in the eviscerating area—where about two-thirds of the plant personnel work. Labor stoppages can be spotted in an instant and corrective action taken. Actually, within a 100 ft. radius, the manager can personally talk to employees in the freezer building, master packing room, eviscerating room, engine room, picking room, and part of the canning station.

Also, when the new 100 ft. x 100 ft. canning room is constructed, this mill will be within similar reach.

While the main processing plant building is 100 ft. wide, it actually consists of two 50 ft.-wide steel frames supporting an aluminum M-type roof. Its steel uprights, located down the middle, are supported by common concrete piers.

Lengthwise, the 260-ft. building consists of 13 steel sections, each 20 ft. long. To enlarge the eviscerating area or to add canning facilities adjacent, we can easily construct a 100 ft. x 100 ft. steel addition in two 50 ft. x 100 ft. sections. This type structure permits additions which always appear symmetrical, with minimizing of obstructing posts.

Connecting an additional section to the present eviscerating area could be accomplished by taking down the latter's non-supporting concrete block wall and making one big room 200 ft. wide. Or we could take down just enough blocks to make two double connecting doors.

Our present public utilities and steam boiler have been sized and located with these projected additions in mind. Actually, these facilities are a hub around which to build and will be ideally central when expansion takes place. This kind of planning saves many steps in maintenance and supervision of equipment, also drastically reduces investment in pipes and wiring.

More Gains Scored

While thoughtful layout and stress on departmental production are primary contributors to plant flexibility, other innovations in initial planning have been found to add greatly to plant mobility.

Take our new system of suspended trough hangers (see special panel titled, "56 Work Movements Boiled to 3"). Offhand, this may simply appear as a worthy convenience but hardly vital to overall flexibility. However, besides chalking up a considerable saving in man-hours and in refeeding and retroughing, this system has also scored many other less obvious advantages.

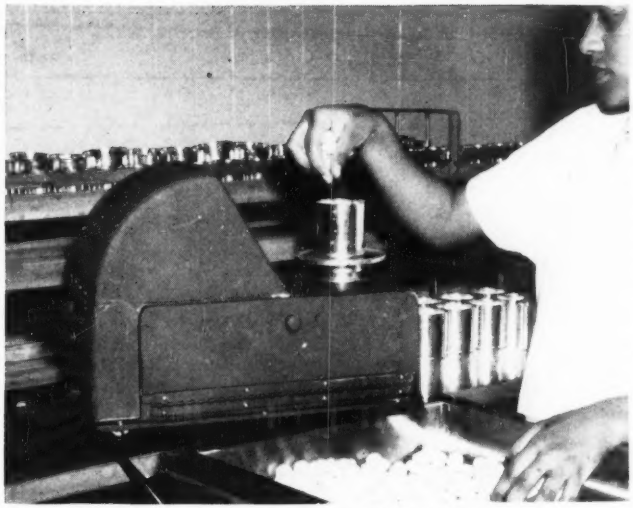
For one thing, there is now much less waste of feed, also a dryer, cleaner floor due to less spilling of water and grain. And there is less breakage of troughs—we estimate a 50 percent cut in depreciation.

Cleanup has been expedited by the new system. Because the troughs are not piled on top, the batteries can now be washed with a hose. And the cleanup job is much better than the usual method of scraping.

Another virtue is the fact that we can now stagger our help in the feeding station. Getting a conventional battery dismantled to kill the chickens may hold up the kill unless there is a lot of help on hand. And, finally, the new system doesn't tie up floor space with empty water troughs.

An additional aid to rapid, uncluttered feeding is an elevated bin supplying feed in bulk to the operation. Not only does this system save bag usage and labor and cut waste of feed, but it also conserves considerable floor space normally occupied by bags on skids.

In our present setup we are using the equivalent of 200 to 300 bags of feed a week. The bulk feed is loaded into the bin automatically and drops through a chute into push carts for distribution to the feeding station.



PACKING MUSHROOMS in cans. The new technique calls for putting in the "C" ingredient (combined with salt in tablet form) prior to sealing.

Okayed by USDA

New definitions and standards of identity for heat-processed mushrooms —effective as this issue of FE was mailed—permit use, as an optional ingredient, of ascorbic acid in amounts not exceeding 37.5 mg. per ounce of drained mushrooms.

Salt is continued as optional in the new regulations but citric acid, vinegar, spice, sucrose and corn sugar have been deleted (p. 8176, Sept. 11 *Federal Register*).

Better Color, *Better* Flavor In Processed Mushrooms

By Adding Ascorbic Acid

J. C. BAUERNFEIND, E. G. SMITH, and G. F. SIEMERS
Hoffmann-La Roche, Inc., Nutley, N. J.

Bane in the glass-packing of mushrooms is the development of a muddy grayness in the product due to the heat treatment.

But tests now show that addition of ascorbic acid will retard this discoloration—and also aid in the retention of the fully-cooked characteristics of the processed product.

Besides the particular benefits for the processor packing in glass, three advantages are also seen for the packer of mushrooms in tin cans: 1. The season's pack may be moved more quickly into the trade channels, since storage is not required to await lightening in color through action of the tin surface; (2) after opening of the can, the mushrooms will retain their color and flavor longer, whether stored in refrigerator or at room temperature, and either in or out of the can; (3) these tinned mushrooms are superior to those not so treated, as demonstrated by numerous studies with taste panels.

When mushrooms are packed in glass jars, the dark color developed during processing remains or intensifies during the storage, bringing about poorer quality, consumer resistance, and hence decreased sales.

Accordingly, attempts were made to produce glass-packed mushrooms having the color characteristics of the tinned product.

It was noted that crystalline ascorbic acid has been successfully used in the commercial processing of frozen sliced fruit, frozen fish fillets, and in home canning and freezing.[1] Therefore, between 1945 and 1951, experimental packs of mushrooms were prepared to ascertain the effect of ascorbic acid on color and flavor changes during processing and storage. The growing and canning of mushrooms and data on their nutritive value have been detailed elsewhere.[2,3,4]

In November, 1949, experimental packs were prepared through the cooperation of a Pennsylvania mushroom packer, Owens-Illinois Glass Co. and Hoffmann-La Roche, Inc.

Sorted, fresh mushrooms were steam-blanched and filled into glass and tin containers in 4 oz. lots followed by hot water. Ingredients such as salt, ascorbic acid, and citric acid were added in tablet form prior to sealing the containers. In all instances where salt was used without citric acid, a 40-grain tablet was used. When both salt and citric were used, the tablet consisted of 1.6 gr. citric acid and 38.4 gr. salt. Ascorbic acid was added by means of a second soluble-type tablet. Processing time was 20 min. at 250 deg. F. for the tin-packed product, compared to 23 min. at 240 deg. F. for the glass pack.

Observations were made on acidity, weight of contents, color, flavor, ascorbic acid, and total vitamin C content after canning and after several month's storage at room temperature (72-75

TABLE I—GLASS-PACKED MUSHROOMS—Data on Color and Flavor Improvement by Ascorbic Acid

Sample	Ingredients Added	pH	Ascorbic Acid (Mg./Can)	Total Vitamin C (Mg./Can)	Wt. of Contents (Gr.)	Color[a]	Flavor[b]
Mushroom Buttons							
After Processing							
A-1	Salt, 40 gr.	....	3	3	214.7	Dark; muddy gray	Oxidized
2	Salt, citric acid, 1.6 gr.	....	...	...	.....	Slightly dark; gray	Slightly oxidized
3	Salt, citric, 150 mg. ascorbic acid	....	...	...	211.5	Good; tan	Good flavor
3a		....	103	103	214.2	Good; tan	Good flavor
4	Salt, citric, 300 mg. ascorbic acid	....	234	247	211.0	Good; tan	Good flavor
4a		....	244	248	208.9	Good; tan	Good flavor
5	Salt, 150 mg. ascorbic acid	.....	120	126	213.1	Fairly good; tan-gray	Good flavor
5a		.....	129	137	211.1	Fairly good; tan-gray	Good flavor
6	Salt, 300 mg. ascorbic acid	....	241	252	218.3	Good; tan	Good flavor
6a		....	294	294	212.9	Good; tan	Good flavor
7	Salt, 450 mg. ascorbic acid	....	393	411	213.0	Good; tan	Good flavor
7a		....	282	400	206.6	Good; tan	Good flavor
After Storage For 3 Months							
A-1	(Same as list above)	6.28	...	...	.....	Very dark, very muddy gray	Oxidized, flat, old
2		5.77	...	...	.....	Dark; muddy gray	Less oxidized, off-flavor
3		5.50	90	101	217.6	Fairly good; tan	Fairly good
4		5.41	221	236	215.4	Good; yellowish tan or light tan	Good canned mushroom flavor
5		6.01	115	123	216.8	Fairly good; tan-gray	Fairly good
6		5.69	235	244	215.5	Good; tan	Good canned mushroom flavor
7		5.35	373	387	213.4	Good; yellowish tan or light tan	Good canned mushroom flavor
Sliced Mushrooms							
After Processing							
L-1	Salt, 40 gr.	6.35	1.7	1.7	206.9	Dark; muddy gray	Oxidized, flat
2	Salt, citric acid 1.6 gr.	5.94	...	...	.....	Slightly dark; gray	Oxidized
3	Salt, citric, 150 mg. ascorbic acid	5.55	81	92	212.8	Tan	Good mushroom flavor
3a		5.55	...	...	209.2	Tan	
4	Salt, 150 mg. ascorbic acid	6.00	107	117	208.4	Gray-tan	Fairly good mushroom flavor
4a		6.00	127	134	207.9	Gray-tan	
After Storage for 3 Months							
L-1	(Same as list above)	6.20	...	...	.....	Quite dark; muddy gray	Oxidized, old
2		5.71	...	...	.....	Dark, gray	Less Oxidized
3		5.57	97	....	207.2	Best, tan-gray	Fairly good canned flavor
4		6.00	115	...	206.8	Fair, slightly tan-gray	Fairly good canned flavor

[a] All color ratings were made on mushrooms only. There were no significant texture differences.

[b] All flavor opinions were based on mushrooms and liquid.

Note: After 8 months of storage at 72 deg. F. samples were assayed for ascorbic acid and total vitamin C, respectively, as follows: A-1, 0.8 and 0.7 mg. per can; A-4, 154 and 222 mg.; A-5, 112 and 122 mg; and A-6, 224 and 237 mg. Total vitamin C is combined reduced ascorbic acid and dehyroascorbic acid as determined by photoelectric dichlorobenzenone-indophenol method after hydrogen sulfide reduction; ascorbic acid or reduced ascorbic acid is determined by same method before reduction. Both reduced ascorbic acid and dehydroascorbic acid are biologically active forms of vitamin C.

deg F.). Tables I and II summarize.

A limited mushroom pack in tin containers (4 oz. of mushrooms) was also processed with ascorbic acid or sodium ascorbate in August, 1951, a New York packer cooperating.

Washed mushroom buttons were blanched at 200 deg. F., cooled in cold water, and hand-packed. Tablets of salt and the ascorbic compounds were placed in tin cans with the mushrooms and hot water before sealing. Cans were processed at 240 deg. F. for 25 min. and then water-cooled.

In 1945, the value of added ascorbic acid in delaying the so-called oxidized cooked taste of canned mushroom soup was examined under commercial packing conditions with the cooperation of a Michigan processor. An aqueous solution of ascorbic acid was added to the soup just prior to filling and sealing. The sealed cans were heat-processed, cooled, and packaged in cartons. Table III gives results.

Additional observations (recorded in Table IV) were made on the rate of darkening of the heat-processed mushrooms and juice after opening and exposing the pack to air. In most of the plant trials, arcorbic acid in tablet form and hot water were added to blanched mushrooms in the container prior to sealing. In other trials, not described in detail here, ascorbic acid was introduced into the mushrooms prior to blanching by a vacuum process. No advantage by this method was found over the addition of ascorbic acid to the blanched product.

Ready-to-serve products, such as creamed mushrooms, mushroom broth with vegetables, and cream of mushroom soup, were prepared from the heat-processed products with and without ascorbic acid. These were then evaluated for flavor differences under code by an experienced taste panel. All samples were tasted under red lights to eliminate color effects.

Creamed mushrooms and mushroom broth with vegetables were prepared as follows: (designations identify samples, see accompanying tables): From glass-packed mushrooms processed with salt (A-1), and with ascorbic acid plus salt (A-6); and from tin-packed mushrooms processed with salt (K-1), and with ascorbic acid plus salt (K-6). Cream of mushroom soup

TABLE II—TIN-PACKED MUSHROOMS—Data on Color and Flavor Improvement by Ascorbic Acid

Sample	Ingredients Added	pH	Ascorbic Acid (Mg./Can)	Total Vitamin C (Mg./Can)	Wt. of Contents (Gm.)	Color[a]	Flavor[b]
Mushroom Buttons							
After Processing							
K–1	Salt, 40 gr.	6.19	...	...	.....	Dark; muddy gray	Oxidized, old
2	Salt, citric acid 1.6 gr.	5.77	...	...	.....	Slightly dark; gray	Less oxidized
3	Salt, citric, 150 mg. ascorbic acid	5.58	...	...	.....	Tan	Good flavor
4	Salt, citric, 300 mg. ascorbic acid	5.58	...	...	.....	Tan	Good flavor
5	Salt, 150 mg. ascorbic acid	6.00	...	...	.....	Tan	Good flavor
6	Salt, 300 mg. ascorbic acid	5.68	...	...	.....	Tan	Good flavor
After Storage For 3 Months							
K–1	(Same as list above)	6.25	...	...	.....	Slightly dark; gray; lighter than A–1	Oxidized, flat
2		5.81	...	...	.....	Very slightly dark throughout; much lighter than A–2	Slightly oxidized
3		5.68	101	109	206.3	Good; yellowish tan, slightly lighter than A–3	Good
4		5.32	224	239	208.0	Good; yellowish tan, about same as A–4	Good
5		6.01	113	124	206.7	Good; yellowish tan, about same as A–5	Good
6		....	254	...	.....	Good; yellowish tan, slightly lighter than A–6	Good
Sliced Mushrooms							
After Processing							
Q–1	Salt, 40 gr.	6.32	...	...	.....	Dark; muddy gray	Oxidized
2	Salt, citric acid 1.6 gr.	5.95	...	...	.....	Slightly dark; gray	Fairly good
2	Salt, citric, 150 mg. ascorbic acid	5.55	110	116	200.2	Tan	Good
3a		5.55	104	104	199.5	Tan	Good
3	Salt, 150 mg. ascorbic acid	6.00	115	116	202.7	Gray-tan	Fairly good
4a		6.00	116	116	202.9	Gray-tan	Fairly good
After Storage For 3 Months							
Q–1	(Same list as above)	6.12	...	...	.....	Slightly dark; tan-gray	Slightly oxidized, better than L–1
2		5.72	...	...	.....	Tan	Fair
3		5.49	97	104	201.7	Good; yellow-tan or light tan	Fairly good canned mushroom flavor
4		5.94	106	106	203.4	Good; tan	Fairly good flavor
Discolored Mushroom Stems and Pieces							
After Processing							
Z–1	Salt, 40 gr.	6.32	...	...	.....	Dark; muddy gray with dark areas	Oxidized
2	Salt, citric acid 1.6 gr.	5.71	...	...	.....	Tan-gray with dark areas	Acceptable
3	Salt, citric, 300 mg. ascorbic acid	5.11	253	259	205.8	Tan-gray with dark areas	Acceptable
3a		5.11	259	259	206.9		Acceptable
4	Salt, 300 mg. ascorbic acid	5.61	239	240	204.0	Tan-gray with dark areas	Acceptable
4a		5.61	264	269	201.4		Acceptable
5	Salt, citric, 150 mg. ascorbic acid	5.32	99	105	200.8	Tan-gray with dark areas	Acceptable
5a		5.32	114	117	203.9		Acceptable
6	Salt, 150 mg. ascorbic acid	5.92	123	128	204.3	Tan-gray with dark areas	Acceptable
6a		5.92	114	120	206.1		Acceptable
After Storage For 3 Months							
Z–1	(Same as list above)	6.18	...	...	.....	Muddy gray with darker spotting	Oxidized, old
2		5.62	...	...	.....	Gray-tan with some dark spotting	Slightly oxidized
3		5.02	242[c]	...	203.6	Light-tan with some dark spotting	Acceptable canned flavor
4		5.55	225[c]	...	201.8	Tan with some dark spotting	Acceptable canned flavor
5		5.69	125[c]	...	203.1	Tan with some dark spotting	Acceptable canned flavor
6		5.85	129[c]	...	200.6	Tan with some dark spotting	Acceptable canned flavor

[a] All color ratings made on mushrooms only. There were no significant texture changes.
[b] All flavor opinions based on mushrooms and liquid.
[c] Ascorbic acid value obtained after 5 months of storage.

was prepared from tin-packed mushrooms processed with salt (U-1) and with ascorbic acid plus salt (U-4). Standard directions for the preparation of these products were followed.

Plant experiments demonstrated that 150 to 300 mg. of ascorbic acid, added with or without citric acid, per 7 fluid ounce pack containing approximately 4 oz. of drained mushrooms very noticeably retard development of the muddy-gray color when the product is packed in glass jars with tinned closures of 2½ in. diameter.

In this size pack, 300 mg. of ascorbic acid were somewhat more effective than the lower level, and 450 mg. showed no significant improvement.

It is evident that on long exposure to the tin surface in the cans, mushrooms packed with salt slowly be-

TABLE III—HOW FLAVOR OF MUSHROOM SOUP Is Improved By Adding the Acid

Ascorbic Acid Content (Mg. Per 11-Oz. Can)

Sample	Ingredients	After Processing	After Storage For: 500 Hr. 104 deg. F.	6 Months 72 deg. F.	12 Months 72 deg. F.
1	Control pack	5.5	.....	.....	..... [a]
2	Ascorbic acid, 100 mg	79[b]	74	75	77[a]
3	Control pack	5.5	.....	5.6	5.8
4	Ascorbic acid, 93 mg	67	63	62	61

Note: Taste panel evaluations on coded samples after processing demonstrated ascorbic acid treated product to taste more like freshly cooked product. Tests after 500 hr. and 12 months storage: Sample 2 was superior to 1, and sample 4 was superior to 3 in flavor. At end of 12 months, nontreated samples also possessed a darker color than treated ones.

[a] pH of control—6.10; pH of treated—6.05.

[b] A second can opened, its contents diluted with water and heated, to serve, demonstrated an ascorbic acid content of 66 mg. per can.

TABLE IV—CHANGES IN COLOR of Processed Mushrooms Exposed to Air Are Delayed by Ascorbic Acid

Sample	Ingredients Added	Color of Juice: After opening container	After air exposure[a]
	Glass Jar Pack		
A-1	Salt, 40 gr.	Yellow-tan	Amber, reddish-tan (plate 13, K9)[b]
2	Salt, citric acid 1.6 gr.	Yellow-tan	Dark tan (plate 13, L8)
3	Salt, citric, 150 mg. ascorbic acid	Slightly greenish-tan	Slightly greenish-yellow (plate 12, L2)
4	Salt, citric, 300 mg. ascorbic acid	Slightly greenish-yellow	Greenish-yellow (plate 12, L3)
5	Salt, 150 mg. ascorbic acid	Slightly yellow-tan	Yellow-tan (plate 12, L4)
6	Salt, 300 mg. ascorbic acid	Slightly greenish-yellow	Slightly greenish-yellow (plate 12, L2)
7	Salt, 450 mg. ascorbic acid	Slightly greenish-yellow	Slightly greenish-yellow (plate 12, L2)
	Tin Can Pack		
K-1	Salt, 40 gr.	Yellow-tan	Dark amber (plate 13, K11)[b]
2	Salt, citric acid 1.6 gr.	Yellow-tan	Amber (plate 12, L9)
3	Salt, citric, 150 mg. ascorbic acid	Yellow	Yellow (plate 11, L3)
4	Salt, citric, 300 mg. ascorbic acid	Yellow	Yellow (plate 11, L1)
5	Salt, 150 mg. ascorbic acid	Slightly yellow-tan	Yellow-tan (plate 12, L4)
6	Salt, 300 mg. ascorbic acid	Slightly greenish-yellow	Slightly greenish-yellow (plate 12, L2)

[a] Opened container held 24 hr. at room temperature.

[b] Plate numbers and letters in parentheses refer to color charts in *Dictionary of Color*, 1st Edition, 1930, A. Maerz and M. Rhea Paul, McGraw-Hill Book Co., Inc., New York City.

come lighter in color. This transformation is accelerated by increasing the acidity of the juice. As the muddy-gray color disappears, the product gradually assumes a tan color. Addition of ascorbic acid to tin-packed mushrooms provides a product which, after processing, is immediately superior in color to the tin-packed product without ascorbic acid.

In these studies, use of 150 mg. of ascorbic acid with salt and water in a can or jar holding 4 oz. of drained mushrooms permitted an acidity range of pH 5.9-6.0, which was close to the acidity range of mushrooms packed with salt and water (pH 6.1-6.3). In studies where ascorbic acid and its sodium salt, sodium ascorbate, were tested for their relative effectiveness in retarding the discoloration, the sodium salt was less effective.

Discoloration of heat-processed mushrooms and juice in glass jars as well as tin cans becomes more pronounced when the cans or jars are opened and the contents are exposed to air at room temperature (75 deg. F.). In this case, the liquid content becomes about three to four times darker on overnight exposure to air.

This observation indicates that the discoloration is an oxidative phenomenon accelerated by oxygen from the air. This change has been stated to be due to the presence of oxidation-reduction systems[5]. Added ascorbic acid, which inhibits degradation of color and flavor quality during heat-processing and storage of mushrooms, also delays discoloration after opening.

The ascorbic acid treatment does not up-grade processed discolored mushrooms. In fact, blemishes are more pronounced by contrast, and hence are more easily seen, as compared with discolored mushrooms having an overall, muddy-gray color.

Flavor of the ascorbic acid-treated, processed mushrooms was more characteristic of freshly cooked mushrooms, while the flavor of the discolored mushrooms without ascorbic acid or tin exposure was flat and oxidized. The flavor value could be somewhat correlated with the muddy-gray color development.

Ready-to-serve, cooked products prepared from processed mushrooms packed with added ascorbic acid and salt in either tin or glass containers were judged to possess flavor associated with freshly cooked mushrooms and to be equal in that flavor. Cooked products prepared from mushrooms packed with salt possessed an oxidized or "old" flavor. Mushrooms packed in tin with salt produced cooked preparations slightly superior to mushrooms packed in glass with salt. In canned mushroom soup, the addition of ascorbic acid prior to sealing had a favorable effect on the color and flavor of the product after processing and storage.

Use of a salt-ascorbic acid tablet is suggested for the long-time commercial practice of processing mushrooms. The added hot water may overflow the top of the container, a practice which, with the heat of the water, prohibits the preliminary solution of granular ascorbic acid in the water. With the ratio of ascorbic acid and salt probably remaining reasonably constant in this combined form, one tablet could be used for the 2 oz. (drained weight) container, two for the 4 oz., and four for the 8 oz. container. The other alternate (the more practical) would be to have tablets in various sizes, one of which could be used for each container.

In addition to the tablet suggestion, if processors are using the bulk salting method, granular ascorbic acid could be mixed with the salt and fed into the containers. If this were done, the overflow of hot water during canning would have to be controlled in order not to run off dissolved ascorbic acid. This is also a good practice when using the tablet.

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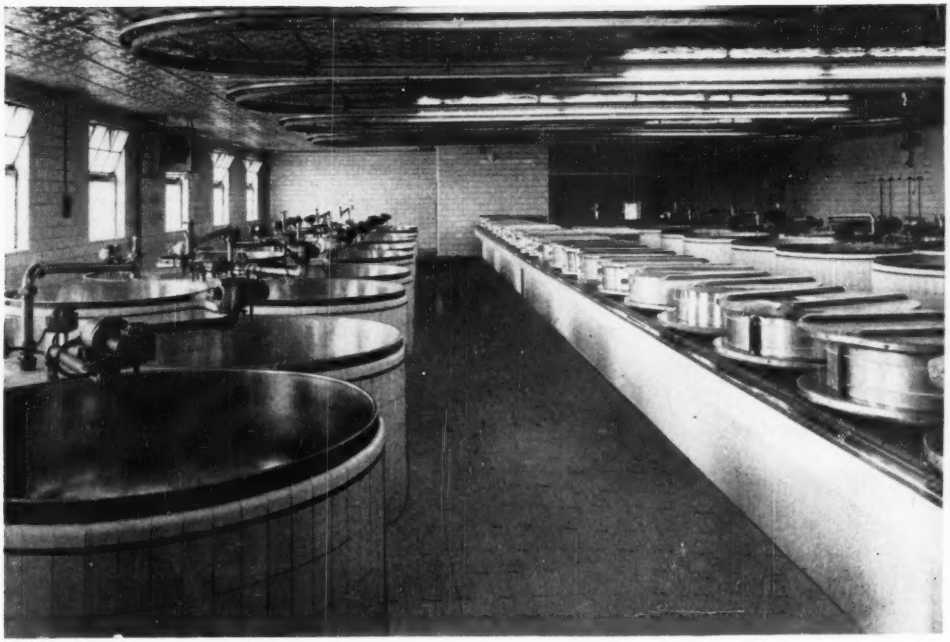


MAKE-ROOM with its patterned aluminum ceiling, its glazed tile wall, press-table, and kettle enclosures, is both sanitary and photogenic. Monorails on ceiling ease transfer of curd from kettles (left) to hoops on press-table (right).

New Cheese Plant *Streamlines Swiss Process*

Operations are mechanized and robotized, workers' duties synchronized with procedures, raw material utilized to maximum in nation's only Gruyere unit

FRANK BROG and C. R. HAVIGHORST

Respectively, Assistant Plant Manager, Star Valley Swiss Cheese Co., Thayne, Wyo., and Associate Editor "Food Engineering"

True progressive planning not only considers today's manufacturing and marketing conditions but also projects the plant's engineering design to cover these three major potentials–

1. Increased supply of raw materials
2. Adequate equipment
3. Means for marketing the increased production.

Design for Star Valley Swiss Cheese Co.'s new $1,000,000 plant at Thayne, Wyo., was predicated on this basis. Potential is high. For against a daily rated capacity of 100 wheels of cheese (180 lb. each), the plant currently is merely putting out 40 wheels. But daily receipts of 100,000 lb. of milk are increasing steadily, and the region is expected to more than double this quantity in the future.

The three separate, yet integrated processes–cheese, butter, and dried whey–are examples of unitized mechanization. Only exception is need for special abilities of trained personnel in the cheese "make-room."

▶ After starting, the two boilers are automatically fed and controlled.

▶ The dried-whey process is robotized with automatic instruments and, when on-stream, runs with little attention.

▶ Mechanical equipment–hoists, lift-trucks, elevators–eliminate nearly all heavy manual lifting.

Streamlined Plant

"My major objective," states Ernest Brog, general manager of Star Valley, "was to design a streamlined plant–one that would require a minimum of labor in the production of quality cheese, with subsequent complete utilization of byproducts from the operation."

Success of his planning is evidenced by these facts:

1. Flow of milk is streamlined with surge or storage tanks strategically located for constant or reserve supply sources.

1—Milk Received

2—Culture Added

3—Surface Turned

7—Dip-Net Tied

8—Curd Drained

9—Hooped

2. Byproducts are processed at a specific time during the day—when the supply is adequate and workers are available.

3. Milk is delivered at one end of the plant and finished products are shipped from the other end.

4. Advanced mechanization and instrumentation make it possible to operate this plant with a minimum number of employees.

5. Interior walls and floors are of ceramic tile, and the ceiling of the "make-room" is of patterned sheet aluminum. Thus sanitation is facilitated and cleanup time and labor cut.

6. Utilization of raw material is near complete.

Star Valley is the only Gruyere Swiss cheese plant in the U. S. Here, only whole milk is used. And butterfat content is not standardized by separation, as is the case in the manufacture of conventional Swiss cheese. The butterfat carries many delicate flavors found in natural milk and imparts them to this rich, soft-textured, cream-like product. Gruyere also is aged longer, being kept in curing rooms for 8-12 months as compared to the 2-8 months for the conventional Swiss cheese.

Receiving

The plant is located stategically within 25 mi. of its most distant milk producer. Daily truck deliveries begin to arrive at the plant at 6 a.m., and shortly afterward cheese processing begins in the make-room.

All milk is received in 10-gal. cans. These move on two conveyors into the plant and through a hot water spray that thoroughly washes the outside of them. Then the milk is inspected for odor, general appearance, and quality (reazurin reductase tests are made five times a week and sediment tests twice). Cans are then emptied into weigh tanks that discharge to a large surge tank. Payment to dairymen is made on the basis of butterfat content of milk.

Emptied cans are placed, upside-down, on conveyors leading to the washers. At the fore-part of these conveyors, the cans pass over a stainless trough into which residual milk drains from the cans and then into a container. An average of 30 gal. of milk daily is recovered by this method. Since it is not entirely free of sediment, it is not used for cheese-making but is added to the whey storage tank.

Following clarification, the milk from the surge tanks is pumped to the make-room, where there are 40 steam-jacketed kettles (3,000 lb.). Swivel-spouts, located between each bank of four units, permit the cheesemaker to divert milk into the kettles in continuous flow.

It requires 2,500 lb. of milk to produce one 180-lb. wheel of Swiss. When this quantity is run into a kettle, heat is turned on (100 psi. steam), the agitator is started, and the milk is heated to 93 deg. F. It is now ready for addition of bacterial cultures and rennet.

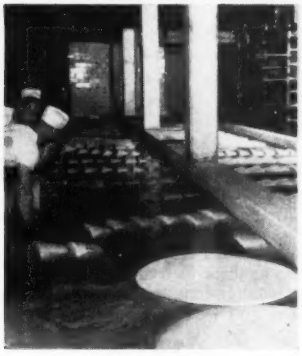
Makes Its Swiss

4—Curd Cut

5—Turned

6—Dipped

10—Cheese Dressed



11—Brined

12—Salted

Two bacterial cultures are used in making Swiss cheese. One, a Bulgaricus type, is a high-acid culture, commonly referred to as "whey-culture." It aids in producing a firm curd, controls the fermentation process, and accelerates flow of whey from curd. The other, a propionic acid fermenting organism, is the "eye-former" that makes the holes and adds flavor. Sixteen ounces of each of these cultures, and 3¼ oz. of rennet are added to the warm milk. Then agitation follows for about 1 min. And in about 35 min., the milk has coagulated and is ready for cutting.

Manual cutting and subsequent handling of curd is the most critical part of the process. Unless it is cut into the proper size at the optimum time, then moved with utmost care to the hoop, many undesirable changes may occur. Texture of the finished product, the curd's ability to properly adhere without unsightly fractures, and even the flavor of the cheese may be affected.

Surface of the jell is first gently turned, then it is cut into curd about the size of wheat grain. About 15 min. is needed to reduce the coagulated milk to the desired curd size. At intervals the curd is turned gently with a scoop, to make possible the cutting into uniform size. Whey is being expelled as cutting proceeds.

Heating Sets Curd

Further draining occurs during the 10 min. allowed for settling. Then the agitator is started and the temperature raised to 124 deg. F. in a period of about 30 min. Agitation continues for a total of about 40 min. before curd is dipped from the kettle.

Acidity, which has an important bearing on the quality of the product, is checked with a potentiometer at various times during the process.

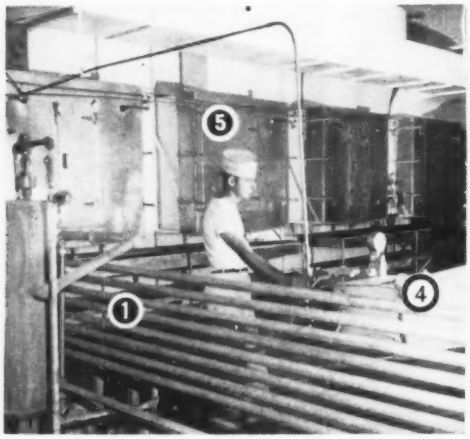
Dipping, too, is a critical part of the manual process. Only the curd obtained by the first pass of the net in the kettle is used to make one hoop. (A second pass is made to recover the small quantity of curd that evaded the first netting. This is added to the curd in a full kettle.)

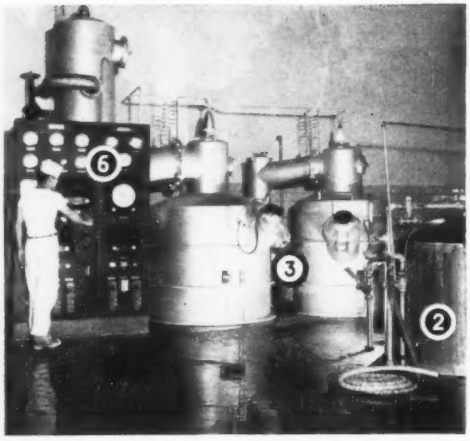
Usually the dippers secure about 400 lb. of curd, still heavy with whey, in this first pass. The net is tied, raised by a motor-hoist, and allowed to drain for 2 min. (There are five hoists arranged on monorail system above the kettles and press-table.)

Then the bagfull of curd is moved to the press-table and gently lowered into a stainless hoop placed upon a circular board. The curd has already developed an affinity, or adhesiveness, and any shock to it will create subsequent mechanical injuries or fractures in the wheel of the cheese.

As it slowly settles into the hoop, and the tension on the net tends to lessen, the neck of the bag is twisted tightly to maintain a uniform pressure on the curd. A press-board and two 50-lb. weights are then placed on top to facilitate formation of the wheel and further whey exudation. This

How Byproducts Are Utilized





WHEY is heated in exchanger (1), pumped to hot-well (2), and drawn into 2-stage evaporator (3). High pressure pump (4) delivers concentrate to dryers (5). Process is automatically controlled by instruments (6).

whey flows into stainless troughs and thence to the whey storage tank.

After the cheese has been solidly formed, the hoop is temporarily removed and hemp-cloth is substituted for the dip-net. At the same time, the wheel is turned completely over. Then the hoop is replaced and tightened. Cloths are changed twice daily.

The next morning, wheels of new cheese are moved (by lift-truck and freight elevator) from the make-room to the brine tanks on the lower floor. Here, hoops and cloths are removed and the cheese gently lowered into the brine.

Specific gravity of this solution prevents the wheels from spreading or losing their shape as they float, partially immersed. Brine is refrigerated mechanically to 40 deg. F., and the cheese cooled to this temperature retains its shape. After four days, wheels are removed from the tank and placed on shelves to dry (another 4-5 days). Temperature here is 50 deg. F., humidity 50 percent. They are then moved by lift truck to the curing room.

Curing of the cheese proceeds slowly, with each wheel getting individual attention for a number of months. Salting begins in the brine tank and continues in the curing room until it has permeated the entire wheel. During this period, wheels are removed from the curing racks at frequent intervals, washed, and resalted.

Before shipping, the cheese is dipped in a mixture of hot, 275 deg. F. paraffin and candy wax. Shipments are made in mechanically refrigerated motor trucks.

Labor Efficiency

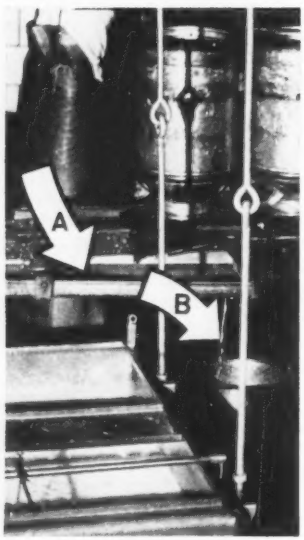
In nearly every food process there are some unit operations that have persistently resisted mechanization or instrumentation. Usually, this is because of a delicate or critical operation in which the trained abilities or senses of operating personnel cannot be supplanted by machines.

The most important unit operations still defying complete mechanization in the manufacture of Swiss cheese are at the very heart of the process—in the make-room. Here, man instead of machine is necessary for control over transition of fluid milk to cheese.

Operations begin early in the morning with only the cheesemaker starting the flow of milk into the kettles. All other plant personnel are busy with additional duties. As soon as the milk in the first bank of kettles coagulates, other men begin to join the cheesemaker. And gradually, as more kettles

(*Turn to page 197*)

Simple Devices Turn the Trick



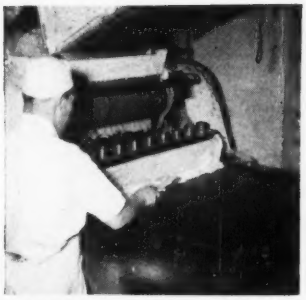
Trough Saves Milk

A stainless steel trough suspended from the in-feed of the can washer saves 30-gal. of milk daily for Star Valley Swiss Cheese Co.

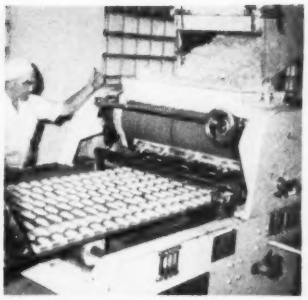
In common practice, the small quantity of milk that remains in each can after it has been emptied into the weight tank is allowed to drain to the sewer. But where receipts are large, the amount of milk involved is worth saving. And when discharged to the sewer this milk can add to the waste disposal problem by contributing to the BOD.

At Star Valley, this residual milk is recovered (see photo) in stainless trough (A), which is fitted under the conveyor between dumping station and can washer. Trough is sloped so milk flows (B) into container beside weigh tank.

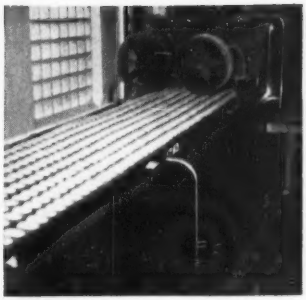
Saved milk is separated into cream and skim. Cream is churned to butter, and skim is added to cheese whey for ultimate concentration and drying.



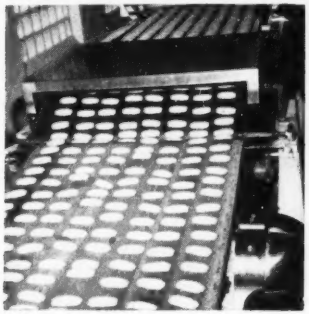
1 **MIXTURE** of flour and shortening is spread on conveyor directly in front of wire cookie-cutting unit.



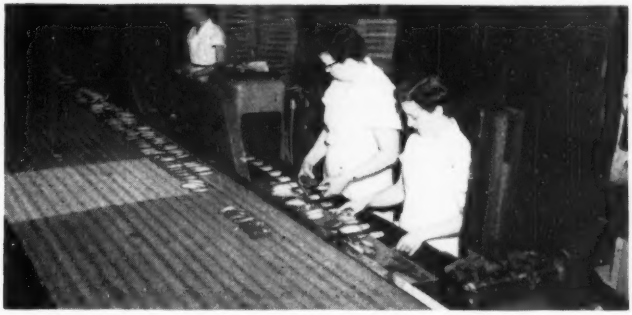
2 **FORMING MACHINE** deposits eight macaroons at a time onto steel band conveyor going to oven.



3 **EMERGING** from gas-fired oven, the baked macaroons are quickly cooled by two circulating fans.



4 **MACAROONS** are peeled without sticking at transfer point.



5 **AFTER** girls inspect them, baked macaroons are fed to this automatic wrapping machine and later packed in boxes for shipment.

Makes Macaroons Continuously

Southern baker ups quality with new formula—which in turn enables redesign of the line for non-stop output of more cookies with less handlings

E. DALTON WHITE
FE Correspondent, Atlanta, Ga.

Through development of a new formula for its bar-shaped macaroons, Schoenith, Inc., of Charlotte, N. C., has found the answer to the problem of increased production—upping output approximately 25 percent.

On top of this, only three workers, instead of the former eleven, are required to handle the operations.

Outstanding in the new formula are the ingredients employed to prevent macaroons from sticking to the steel-band conveyor that takes them through the oven—thereby eliminating the need of kraft paper.

The special cookie formula is the outcome of considerable research by F. W. Kruger, plant superintendent. His experiments resulted in the adoption of ingredients in the macaroon mixture that settle and form a crust-like bottom coating during baking.

► Big advantage is the elimination of two handlings—that is, arranging of the kraft paper upon which the macaroons were formerly deposited, and later its wetting and removal from the conveyor after the cookies emerged from the oven.

Investigations were directed principally toward improving the quality and texture of the macaroons. It was felt that product improvement could be achieved by doing away with the placement of kraft paper on the steel-band conveyor going through the oven. And, in so doing, production could be increased due to less handlings. And also cost would be lowered.

464 Macaroons per Minute

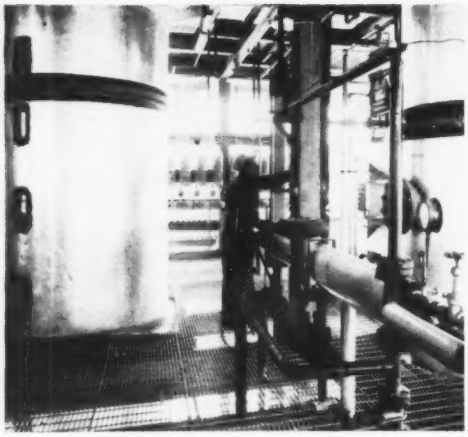
Now for a brief step-by-step account of operations on the new continuous macaroon line:

Dough is prepared in 770-lb. batches. Employed is a 3 bbl.-capacity mixer, equipped with an horizontal, single-blade agitator.

Next, the dough is loaded into a metal buggy and transferred by overhead hoist to the wire cookie-cutting machine. Here, the dough is formed, cut, and deposited on the 38-in. wide, steel-band conveyor. The cookie former and cutter deposits eight 1-oz. portions per stroke, or 464 macaroons per minute.

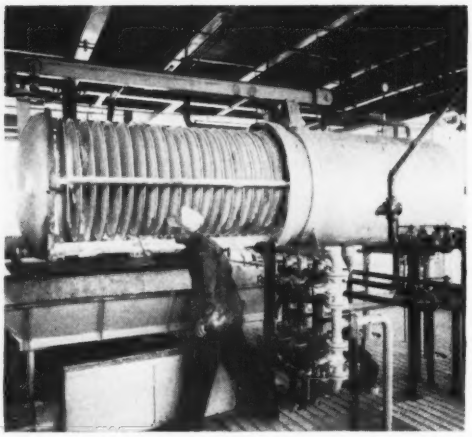
To prevent macaroons from stick-

(Turn to page 160)



Oil is extracted

Rice bran is mixed with hexane in extractor (left) to yield miscella (solvent-rice oil). Solvent is first preheated (center). At right is scrubber tower where fines are removed from vaporized hexane returning in cycle.



. . . filtered

From extractor, miscella goes to surge tank, then to this leaf-type pressure filter for removal of fine particles of bran. Clear filtrate next passes to flash chamber, where most of hexane is recovered for re-use.

Rice Bran Oil—Paying Product

Clear, good-flavored, and resistant to rancidity, it's proving its worth in making of salad and cooking oils . . . Processing steps described

JAMES A. LEE
Southwestern Editor, "Chemical Engineering"

Oil from rice bran has now become an edible oil of commercial importance.

Solvent-extracted from the freshly milled rice bran, the oil is low in free fatty acid. It can be converted by conventional refining and bleaching procedures into a clear, light colored product having a good flavor.

The oil is stable, odorless, neutral, has an iodine value of 102, and is comparable to peanut oil. It is more resistant to oxidation or rancidity than the average cooking oil, and there is little difficulty in winterizing.

Prime use of the product is for manufacture of salad and cooking oils (typical processors are Leghorn Trading Co. and W. Degen Co., both of New York City). Moreover, recent experimentations have developed several unique applications for this oil, such as rust inhibiting, production of sulfonating oils, and spraying of alfalfa for preserving valuable vitamins which otherwise would be lost in conventional production methods.

Bran, from which the oil has been extracted, is bagged and sold as an animal feed with less danger of its becoming rancid in storage. The palatability and digestibility of the bran is improved and in addition, protein content rises to about 15 percent.

The Houston, Tex., plant of Wonder Rice Oil Co., subsidiary of Wonder Rice Mills, is one of two plants in the U. S. for the continuous solvent extraction of oil from rice bran. It has more capacity than the plant of the American Rice Growers Cooperative Assn. in the same city. The extraction part of the new plant was designed by Allis-Chalmers Mfg. Co. and began operations June 13. Capacity is 100 tons of bran per day and 30,000 lb. of semi-refined oil.

This plant is under the direction of Mike Cassidy, who has pioncered the continuous solvent extraction of oil from rice bran and has been affiliated with both of the above-named plants.

Operations are similar to those employed in other oil extraction but differ in equipment detail. The bran is a byproduct of rice milling and contains 15 to 18 percent oil.

Properties and Composition,

TABLE I—PHYSICAL and Chemical Properties of Extracted Rice Bran Oil

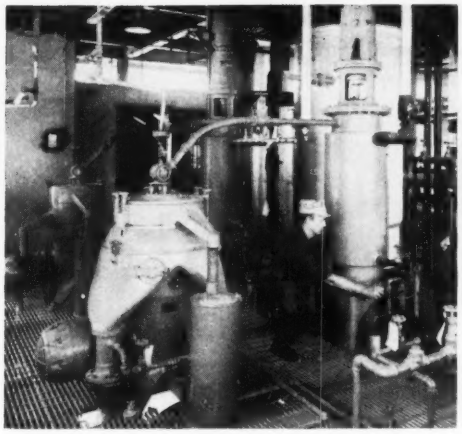
Properties	Crude Oil	Refined Oil
Specific gravity (25/25 deg. C.)	.9187	.9166
Refractive index (25 deg. C.)	1.4720	1.4708
Lovibond color	70Y, 8R	35Y, 3R
Free fatty acids (percent oleic)	4.00	0.05
Iodine value (Wijs)	102	102
Thiocyanogen value	75.9	75.7
Saponification value	185	187
Unsaponifiable matter (percent)	4.00	2.50
Titer (deg. C.)	25.2	25.2
Hydroxyl number	8.7	5.0
Saturated acids (percent)	16.3	16.3

TABLE II—COMPOSITION of the Oil

Constituents	Crude Oil (percent)	Refined Oil (percent)
Glycerides of—		
Linolenic acid	0.8	0.8
Linoleic acid	33.2	33.1
Oleic acid	45.0	46.3
Saturated acids	17.1	17.1
Unsaponifiable matter	3.9	2.7

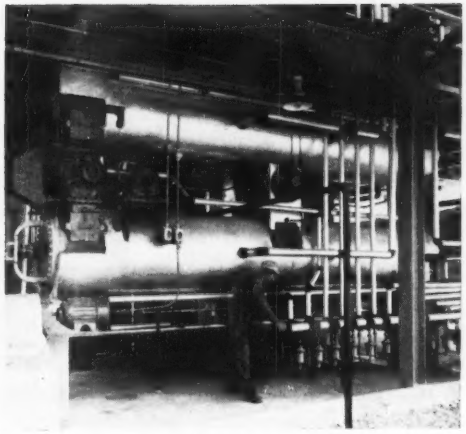
TABLE III—PHYSICAL Characteristics of the Refined Oil

Characteristic	Deg. F.
Cloud point	20
Pour point	18
Smoke point	415
Flash point	615
Fire point	665



. . . refined

After a stripper recovers remaining solvent, crude oil is mixed with caustic (right), then goes to 2-stage centrifuge system (left). First stage: Marketable waxes, gums removed, fatty acids separated. Second stage: Polishing.



. . . and feed is byproduct

Extracted bran is freed of last of solvent in six dryers in series (final two are seen here). Screw conveyor carries finished meal to storage in adjacent building, where it is bagged and shipped for cattle feed.

In this plant, the bran that has been removed from the rice grains is brought from the company's adjacent rice mill via screw conveyor to the solvent-extraction building. Here, the bran is pretreated—moisture content and temperature being adjusted. It is then ready for extraction.

The screw conveyor carries it to the top of the extractor column. Hexane, which is used as a solvent after preheating, enters at the bottom, flows countercurrent to the bran, and the solution leaves from the top as miscella (mixture of oil and solvent).

Spent bran is carried from the bottom of the extractor by a bulk-flow conveyor to the uppermost of six steam-jacketed dryers tied together in series. These dryers are equipped with internal ribbon conveyors.

Hexane is vaporized in the dryers and passes through a vapor-scrubber tower where the fines are removed. The vapor then goes into a condenser and the condensate flows to a decanter tank. Here, the water is separated from the solvent. The latter is re-used.

Free of solvent and odors, extracted bran leaves the bottom of the sixth, or lowest, dryer and is conveyed to the rice mill for bagging and shipping.

The hexane-rice oil passes off from the top of the extractor to the miscella receiving surge tank. Then the miscella is pumped to leaf-type pressure filters that remove the fine particles of bran suspended in the mixture of solvent and oil. Clear filtrate passes to another surge tank and then to a long-tube evaporator steam-heated at 225-230 deg. F. The miscella at that temperature enters a flash chamber where 95 percent of the solvent flashes off, is condensed, and returned to solvent recycle tank.

Oil and remaining solvent are separated in a bubble cap vacuum tower. Recovered solvent is returned to process. Oil from this stripper column is pumped to crude-oil storage in the tank farm. From here it is pumped to a steam-jacketed vertical mixer, wherein caustic is added, then goes to the first centrifuge of a De Laval two-stage system for removal of marketable waxes and gums and partial separation of free fatty acids. It then goes to the second-stage centrifuge for final polishing, and from there to storage tanks for shipment as clarified or semi-refined oil.

Open-Type Structure

Solvent extraction operations are handled in a 38x42-ft. building 53 ft. high. This structure is of open-type design with 7-ft. overhangs from each of the four floors. The latter and the roof are of corrugated Transite. Flooring is subway grating.

Explosion-proof electric equipment, motor drives, switches, and lights are used throughout the building. All processing vessels and all pipelines that are insulated are covered with sheet aluminum. Pipelines are coded in colors to identify the products being handled.

The tank farm contains storage for crude and semi-refined rice bran oil and hexane. The solvent tanks are underground. Capacity of the refined-oil storage is 72,000 gal., and of crude oil 108,000 gal. There are three 10,000-gal. storage tanks for hexane.

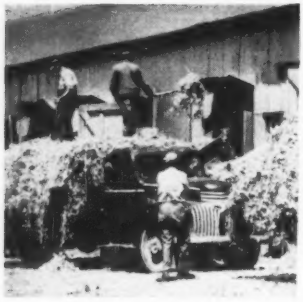
Color Data, Keeping Quality

TABLE IV—COLOR DECREASES Markedly in Oil During Hydrogenation; Data Given on Keeping Quality

Sample No.	Iodine Value	Hydrogenation Time (Hr.)	Lovibond Color Yellow	Red	Keeping Quality Hydrogenated Oil (Hr.)*
1	104.0	0	35.0	3.1	15
2	88.4	12	20.0	2.3	34
3	79.1	19	20.0	1.9	76
4	74.3	23	20.0	1.6	193
5	70.7	26	15.0	1.5	340
6	67.9	28	15.0	1.2	501

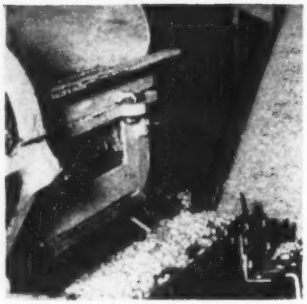
* A seventh sample was hydrogenated to iodine value of 41 and kept 910 hr.

New Technique Gives Facts on These Questions

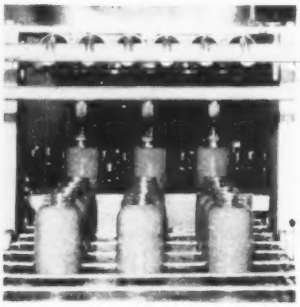


RAW MATERIAL
How should it be sampled?

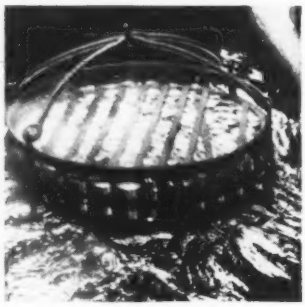
INSPECTION
What does it indicate?



CUTTER
Is it doing best job?



FILLER
When should it be adjusted?



COOLING CANAL
Does it produce spoilage?

FINISHED PRODUCT
Is improvement confirmed?

Quality Control Simplified

For Practical Product Improvement

Here is new table-reference method that— ¶ Shortcuts complex mathematics of statistical technique . . . ¶ Is specially keyed to workable tolerances for bettering foods and their uniformity . . . ¶ Smooths raw-to-finished production to save time, labor, materials

AMIHUD KRAMER
University of Maryland, College Park, Md.

A properly applied product control program will result in an improvement in quality level and/or uniformity of the food, a reduction in operational costs and waste, and, in a more subtle manner, an improvement in employee morale that will prevent production line bottlenecks by anticipating problems.

Granted, statistical quality control is usually associated with high-powered mathematical procedures. But—as shown here—it is possible to replace these with simpler methods which, although not as refined as the classical ones, still retain a high degree of accuracy.

Notably, the new method involves very few mathematical calculations. And it is very convenient since it makes use of previously prepared tables and charts.

Although these applications are sometimes called "quick

A SPECIAL FOOD ENGINEERING REPORT

VALID ON VARIABLES

Heralded as one of the great new developments of industrial technique, statistical quality control has been thought by many to be primarily related to such uniform-product endeavors as making tools, machines, and the like.

Thus, application of S.Q.C. in biological fields such as food production has been presumed less feasible, particularly because here difficulties abound due to inherently greater variability of the raw materials.

But this is a restricted viewpoint.

Actually, much of the early work in statistical quality control was done in the food field—precisely because natural variability of the materials was so great, and factors affecting quality of product so many, that better means were required to distinguish cause and effect and thus speed the way to remedial measures through changes in material, equipment, or production procedures.

Accordingly, methods were specially developed for practical analysis of the complex data—to show whether or not certain changes in food materials, equipment, or processing had real effects on product quality. And from these moves are derived the plant-level applications detailed here.—*A.K.*

and dirty*," they nevertheless are held to be so effective that they bid fair to become routine in food plants.

A thorough quality control program should begin with inspection of raw materials and supplies, continue through all processing stages, and end with an inspection of the finished product before its delivery to the purchaser.

Whenever possible, accurate, objective methods—instrumental or physical-chemical—should be used. For example, acidity as measured by a pH meter, tenderness by the tenderometer, or protein content by Kjeldahl extraction.

Human Evaluations, Too

In some instances quality factors are not measurable by such objective methods, but only by human evaluation, as for example taste testing, or evaluation of miscellaneous defects. In these cases, the problem of quality control is more difficult, but application of statistical methods is even more necessary and rewarding.

Our illustrations here relate to corn, peas, asparagus, lima beans, peanut butter, soluble coffee, apple juice, orange juice, and to apple peelers, froth flotation washers, and cooling canals. However, the examples given are applicable to any kind of food products and equipment.

* J. W. Tukey, "Quick and Dirty Methods in Statistics, Part II—Simple Analyses for Standard Designs," *Proceedings Conference Amer. Soc. for Quality Control*, 5, 189-97, 1951.

TABLE I—PAIRED COMPARISONS Indicate Significant Differences

Total Number of Comparisons	Number of Correct Choices For Odds: 19:1 (5 Percent Level)	99:1 (1 Percent Level)	999:1 (.1 Percent Level)
6	6	...	...
8	7	8	...
10	9	10	...
12	10	11	...
14	11	12	14
16	13	14	15
18	14	15	17
20	15	16	18
25	18	20	22
30	21	23	25
35	24	26	28
40	27	29	32
45	30	32	35
50	33	35	38
60	38	41	44
70	44	46	50
80	50	52	56
90	55	58	62
100	60	63	67
200	113	116	121
300	165	169	175
400	218	223	230
500	270	276	284
600	332	338	347
700	374	480	490
800	427	434	445
900	479	487	499
1000	531	539	552

Quality control can operate in such a way that difficulties may be recognized as they develop and remedial steps taken before a production line goes out of control.

Benefits for the Processor

It will answer the following questions:

1. What size sample should be taken for inspection?
2. How often should a sample be taken, or an inspection be made?
3. Should the raw material be accepted or rejected, and if accepted what should the cost be?
4. Is the quality of the product satisfactory?
5. When should action be taken to adjust equipment or change the quality of the raw materials?

TABLE II—TRIANGULAR COMPARISONS Correctly Identify Odd Samples

Total Number of Comparisons	Number of Correct Selections For Odds: 19:1 (5 Percent Level)	99:1 (1 Percent Level)	999:1 (.1 Percent Level
4	..	..	..
6	5	6	..
8	6	7	8
10	7	8	9
12	9	9	10
15	10	11	12
18	11	12	13
21	12	14	15
24	14	15	16
27	15	16	18
30	16	18	19
35	18	20	22
40	20	22	24
45	22	24	26
50	25	26	28
60	29	30	32
70	33	35	37
80	37	39	41
90	41	43	45
100	45	47	49

TABLE III—SOLIDS CONTENT of Different Varieties of Corn Vary After Processing

Replicate	Alcohol Insoluble Solids (Percent): G x B	Ioana	N. G.	Shoepeg
1	20.8	20.1	21.2	20.8
2	22.1	19.9	21.9	20.6
3	21.5	20.0	21.6	20.7
4	21.5	19.7	21.4	20.4
5	20.0	19.8	21.7	21.2
6	22.2	19.3	22.5	20.5
7	20.3	19.5	21.9	20.5
8	22.2	19.5	22.3	20.9
9	20.8	18.8	22.0	19.9
Totals	191.4	176.6	196.5	185.5
Ranges	2.2	1.3	1.3	1.3
			Sum of ranges = 6.1	

TABLE IV—FACTORS to be Used With Tukey's Method for Determining Significance of Differences

Here, four-figure blocks (to be multiplied by sum of ranges within groups) represent—
Range, 5% Risk Gap, 5% Risk
Range, 1% Risk Gap, 1% Risk

Number of Groups = Number of Ranges Summed	Number of Groups = Number Per Range																			
	2		3		4		5		6		7		8		9		10	
2	3.43	3.43	1.91	1.91	1.63	1.63	1.53	1.53	1.50	1.50	1.49	1.49	1.49	1.49	1.50	1.50	1.52	1.52
	7.92	7.92	3.14	3.14	2.47	2.47	2.24	2.24	2.14	2.14	2.10	2.10	2.08	2.08	2.09	2.09	2.09	2.09
3	2.37	1.76	1.44	1.14	1.25	1.02	1.19	0.98	1.18	0.96	1.17	0.96	1.17	0.97	1.18	0.98	1.20	0.99
	4.42	3.25	2.14	1.73	1.74	1.47	1.60	1.37	1.55	1.32	1.53	1.33	1.52	1.33	1.53	1.34	1.55	1.35
4	1.98	1.18	1.13	0.81	1.01	0.74	0.94	0.72	0.92	0.71	0.92	0.71	0.94	0.72	0.96	0.73	0.97	0.74
	2.96	1.96	1.57	1.19	1.33	1.04	1.24	0.98	1.21	0.96	1.21	0.96	1.21	0.97	1.22	0.98	1.23	0.99
5	1.40	0.88	0.94	0.63	0.85	0.58	0.81	0.56	0.80	0.56	0.80	0.56	0.81	0.57	0.82	0.58	0.84	0.59
	2.06	1.39	1.25	0.91	1.08	0.80	1.02	0.77	0.99	0.76	0.99	0.76	0.99	0.77	1.00	0.77	1.01	0.78
6	1.16	0.70	0.81	0.52	0.75	0.48	0.69	0.47	0.69	0.46	0.69	0.47	0.70	0.47	0.71	0.48	0.72	0.49
	1.69	1.07	1.04	0.73	0.94	0.66	0.86	0.63	0.85	0.62	0.85	0.63	0.85	0.63	0.85	0.64	0.86	0.65
7	1.00	0.58	0.70	0.44	0.63	0.40	0.61	0.40	0.61	0.40	0.61	0.40	0.62	0.41	0.63	0.41	0.63	0.42
	1.39	0.87	0.89	0.61	0.78	0.55	0.75	0.54	0.74	0.53	0.74	0.53	0.74	0.54	0.75	0.55	0.76	0.55
8	0.87	0.50	0.62	0.38	0.57	0.35	0.55	0.34	0.55	0.34	0.55	0.35	0.55	0.35	0.56	0.36	0.57	0.37
	1.20	0.74	0.78	0.53	0.69	0.48	0.66	0.47	0.65	0.46	0.65	0.46	0.66	0.47	0.66	0.48	0.67	0.48
9	0.78	0.44	0.56	0.33	0.51	0.31	0.50	0.30	0.49	0.30	0.50	0.31	0.50	0.31	0.51	0.31	0.52	0.32
	1.03	0.63	0.71	0.46	0.62	0.44	0.59	0.43	0.59	0.42	0.59	0.42	0.59	0.42	0.60	0.43	0.61	0.43
10	0.70	0.39	0.51	0.30	0.46	0.28	0.45	0.27	0.45	0.27	0.45	0.28	0.46	0.28	0.47	0.28	0.47	0.29
	0.91	0.56	0.62	0.41	0.57	0.38	0.54	0.37	0.53	0.36	0.54	0.37	0.54	0.37	0.55	0.38	0.55	0.38

6. Is the finished product satisfactory? Is it really better or worse than a competitive product?
7. Which of two or more machines is most suitable for a particular operation?
8. What information does raw product inspection provide on the manner of handling the material in the plant and on the final quality of the finished product?
9. How should taste-testing panels be set up?
10. Which formula is best?

Here is a typical question put by a food man to a quality control statistician: "I am a manufacturer of peanut butter, and I want to know how often I should take a sample for analysis."

This manufacturer assumes that the answer will be immediately forthcoming in such a statement as "Every thousandth tumbler" or "One sample per hour."

But such a question cannot be answered intelligently until additional information is made available. It is necessary to know the purpose for which the sampling is to be made. Is it to accept or reject the lot, or merely to evaluate it? If the purpose is to accept or reject the lot, an "attributes" sampling plan may be used. If the purpose is to evaluate it, a "variables" plan is required.

Sampling by Attributes

Once it has been established that an attributes plan is required, the following information must be supplied:

1. What is the size of the lot—of tumblers, grain, or what not? If it's a carload, then that may be considered as the lot size. Or the processor's entire production under the same label may be considered as the lot size.

2. What is the acceptance quality level? (A.Q.L.) The processor must decide what percentage of broken tumblers, damaged grains, or slack filled containers he is willing to accept.

3. How precise should the sampling be? What odds does the processor want to take that the lot will be within the limits indicated by the sample?

For example, let us assume that the manufacturer of peanut butter has received a shipment of glass tumblers, and that he must decide whether to accept or reject it. Then he may use an attributes sampling plan. Size of the lot is 100,000, he is willing to accept as many as 0.25 percent broken tumblers; and the usual odds are 19:1 that the lot will fall within the limits indicated by the sample. To enumerate—

1. Size of lot—100,000
2. A.Q.L.—0.25
3. Precision—95 percent (odds 19:1)

The proper sample size may then be determined by reference to tables in the publication, *Sampling Procedures for Inspection by Attributes* (Mil-std 105A), obtainable from the Government Printing Office, Washington, D. C.

Sampling by Variables

In the sampling of foods—especially raw foods for processing—the processor is not often in a position to accept or reject lots of material. He is more likely to accept all the material offered within reasonable limits.

However, say he wants to sample each lot adequately in order to offer a fair price for the material, and, also, to obtain information as to how the material should be handled, and to know what the quality of the finished product might be. This involves sampling by variables rather than attributes. Here, ready-made tables are not available, although they may be prepared for specific purposes. In addition to the information required for setting up an attributes plan, it is necessary to know, in advance, the anticipated variability within the lots of the material to be inspected.

This variability is usually expressed by a statistic known as the standard deviation, usually symbolized by the Greek letter sigma (σ). Thus an average value ($\bar{x}$) plus or minus ($\pm$) the standard deviation (σ)—($\bar{x} \pm \sigma$)—means that approximately two-thirds of the individual samplings will fall within one standard deviation, above or below the average value, and about 95 percent, or 19 out of 20 individual samplings, will fall within two sigmas (i.e., standard deviations) of the mean.

Methods for calculating standard deviations may be found in any statistics handbook. A good description of this procedure, as well as a short method, may be found in the book by E. L. Grant*.

For example, it is common practice in some lima bean

* E. L. Grant, *Statistical Quality Control*. McGraw-Hill Book Co., New York City, 1946.

growing areas to evaluate the quality of raw shelled beans, offered for processing, by determining the percent of white ones occurring in a 4-oz. sample drawn from larger, 3-lb. sample.

When 20 separate samplings were made of one lot, the percent whites were found to average 12.1, and the standard deviation was 3.7—or 12.1 ∓ 3.7. This indicated that, in about one out of three cases, a single sampling obtained in the usual manner could have resulted in a percent whites value above 15.8 or below 8.4.

This 7-8 percent could easily have caused a difference of $15 per ton in the price paid to the grower. It could have meant the difference between profit and loss for either the grower or the processor. Obviously, therefore, a single sampling of this type is not sufficient.

As the number of samplings is increased, results tend to approach the true value of the lot, in proportion to the square root of the number of samplings. Hence, if the desired precision is $\pm$ 1.0, and N is the number of samplings, then the standard deviation divided by the square root of N should equal 1.0. In the case of the percent white lima beans, it is $2.7/\sqrt{N} = 1.0$, or $N = 13.7$. Thus about 14 individual determinations would be required in order to reduce the error to 1 percent.

Control Charts

A similar procedure, based on the calculation of the standard deviation, may be used to establish limits for a quality control chart. These upper and lower limits are ordinarily set at three sigmas—i.e., the upper control limit is set at the mean plus three times the standard deviation, and the lower control limit is set at the mean minus three times the standard deviation. This would indicate to the processor that as long as the usual good job is done, over 99 percent of his check samples should fall within the limits.

Let us assume the processor of lima beans finds that, with the usual attention to the handling through the washers, quality separators, and sorting belts, the final finished product contains 0.95 ± 0.20 white beans. The mean line would of course be set at 0.95, the upper control limit would be .95 plus 3 x .20, or 1.55, and the lower control limit would be set at 0.35.

If a routine inspection indicates that more than 1.55 percent white beans are found in the finished product, the processor is justified in assuming that something is going out of control and that more care should be exercised in removing the white beans. If, on the other hand, he finds less than .35 percent whites in the finished product, he is justified in assuming that too much effort is being given to the removal of the whites, and that this operation is more expensive than it needs to be.

Measures of Significance

Because of inherent variability in natural products, in manufacturing operations, and in measuring instruments themselves, the question frequently arises: Are the observed differences real, or are they merely due to chance variability? This question may be posed whenever two or more varieties, sources of supply, manufacturing lines, or lots of goods, are compared. When differences are found to be real they are termed "statistically significant" or more briefly "significant."

Two levels of significance have come into general usage. When the calculated odds are better than 19 to 1 that the difference is not due to chance alone, the results are merely called "significant" or "significant at the 5 percent level." If the odds are better than 99 to 1, the results are called "highly significant" or "significant at the 1 percent level."

The classical methods for calculating significance are Student's method, involving the "T" test, and the analysis of variance involving the "F" test. Rather than attempting to cover these more complex and lengthy procedures here, we shall enter directly into a discussion of a number of quick methods.

Paired Comparison—Attributes

The simplest possible situation is when two units are compared and no values are assigned to the test results except to indicate which of the pair is better. Thus an N number of paired tests are made on the two units. After each pair of tests, a decision is reached as to which gave the better results. When a sufficient number of pairs of tests is made, a conclusion may be reached as to which unit is better by reference to Table I.

Example A. Two types of apple peelers are to be compared using 50 apples selected at random. From these, two apples are drawn simultaneously and fed to the

TABLE V—CORRELATION COEFFICIENTS at the 5 Percent and 1 Percent Levels of Significance

Number of Pairs (N)	5 Percent	1 Percent	Degrees of Freedom	5 Percent	1 Percent
3	.997	1.000	24	.388	.496
4	.950	.990	25	.381	.487
5	.878	.959	26	.374	.478
6	.811	.917	27	.367	.470
7	.754	.874	28	.361	.463
8	.707	.834	29	.355	.456
9	.666	.798	30	.349	.449
10	.632	.765	35	.325	.418
11	.602	.735	40	.304	.393
12	.576	.708	45	.288	.372
13	.553	.684	50	.273	.354
14	.532	.661	60	.250	.325
15	.514	.641	70	.232	.302
16	.497	.623	80	.217	.283
17	.482	.606	90	.205	.267
18	.468	.590	100	.195	.254
19	.456	.575	125	.174	.228
20	.444	.561	150	.159	.208
21	.433	.549	200	.138	.181
22	.423	.537	300	.113	.148
23	.413	.526	400	.098	.128
24	.404	.515	500	.088	.115
25	.396	.505	1,000	.062	.081

TABLE VI—TENDEROMETER READINGS on Raw Peas Predict Quality of Canned Peas

Code No.	Tenderometer: Raw Peas	Tenderometer: Rank	Alcohol Insoluble Solids: Canned Peas	Alcohol Insoluble Solids: Rank	Difference (d) (3-5)	Difference (d)² (3-5 Squared)
1	2	3	4	5	6	7
7	80	1	9.5	1	0	...
3	83	2	10.0	4	2	4
12	84	3	9.7	2	1	1
18	88	4	9.9	3	1	1
5	92	5	10.5	5	0	...
9	92	5	11.0	6	1	1
16	94	7	12.0	7	0	0
4	95	8	12.8	8	0	0
1	99	9	13.6	10	1	1
13	100	10	13.0	9	1	1
11	100	10	13.8	11	1	1
19	101	12	14.0	12	0	0
10	102	13	14.5	15	2	4
15	104	14	13.9	13	1	1
2	104	14	14.3	14	0	0
8	105	16	14.7	17	1	1
17	105	16	15.2	19	3	9
6	106	18	15.0	18	0	0
14	107	19	14.5	15	4	16
20	110	20	15.6	20	0	0

$\Sigma d^2 = 41$

machines. The peeled apples are then examined and the machine doing the better peeling job is noted. This process is repeated 25 times and the number of times each machine is found to be superior is noted. Let us assume that, in this case, Machine A did the better peeling job 16 times, while B was better 9 times. We then refer to Table I and find the following for 25 comparisons:

19:1	99:1	999:1
18	20	22

Since Machine A was superior only 16 times we may conclude that there is no real difference between the peelers or that we did not perform enough tests.

Example B. A froth flotation washer is installed in a pea line and the processor wants to know whether it will result in a cleaner product. Peas from the same lot are introduced into the line to which the washer was added and, simultaneously, to a parallel line with no such unit.

At regular intervals, 10 pairs of trays are used to catch a quantity of peas after they emerge from the froth flotation washer and from the equivalent place in the other line. Each pair of trays is examined to see which is freer from loose skins and other extraneous material.

In this case, we find that the line containing the froth flotation washer had the cleaner peas in 9 of the 10 pairs of trays. Referring to Table I, we find the following for 10 comparisons:

19:1	99:1
9	10

We may, therefore, conclude that introduction of the froth flotation washer resulted in a real improvement in cleanliness. In short, the odds were 19:1 that the improvement was due to the washer and not to chance variability. If all 10 trays containing material emerging from the froth flotation washer had been found to be cleaner we could have concluded that the odds were at least 99 to 1 against the results being due to chance alone.

As in the case of sampling procedure, when two units are compared and actual values are assigned, the problem becomes more complicated. It is worth noting, however, that a new ranking method has been developed by Wilcoxon*, which is rapid, accurate, and quite simple to apply by anyone. In general, it may be stated that more information can be obtained from the same amount of sampling by using a variables plan, as compared to an attributes plan.

TABLE VII—TASTE PANEL Scores on Frozen Asparagus

Duration of Blanching, Sec.		Score Replications 1	2	3	4	5	6	Total	Range
Judge A	20	1	2	2	2	4	2	13	3
	40	1	2	2	2	3	4	14	3
	80	4	5	5	4	5	5	28	1
	160	5	4	5	5	4	1	24	4
		Range of Totals 13–28 = 15						79	11
Judge B	20	3	4	1	2	5	3	18	4
	40	5	2	4	4	3	4	22	3
	80	2	2	3	5	2	4	18	3
	160	4	1	3	4	4	4	20	3
		Range of Totals 18–22 = 4						78	13
Judge C	20	2	2	2	2	2	2	12	0
	40	3	2	4	4	3	2	18	2
	80	4	5	3	5	5	4	26	2
	160	4	4	4	4	5	5	26	1
		Range of Totals 12–26 = 14						82	5
Judge D	20	2	4	2	3	5	3	19	3
	40	2	3	4	4	4	4	21	2
	80	5	5	5	5	5	4	29	1
	160	4	5	5	4	5	5	28	1
		Range of Totals 19–20 = 10						97	7
Judge E	20	3	2	2	2	2	3	14	1
	40	1	1	2	2	3	3	12	2
	80	2	5	4	4	3	5	23	3
	160	4	5	3	4	5	5	26	2
		Range of Totals 12–26 = 14						75	8

Triangular Comparison—Attributes

In some circumstances selection of the best unit is to be made from three instead of two. Here the procedure would be the same as that in paired comparison of attributes, except that reference would be made to Table II.

It is obvious that here the odds of selecting the proper unit by chance are only 1 out of 3, whereas in the case of the paired comparison the odds are 1 out of 2.

Example A. Three kinds of typewriters are available and the decision is to be made whether any one is superior to the others. There are eight stenographers in the office who may use these typewriters. Each of them is given the opportunity to try out the machines. If six or more of the stenographers definitely select one typewriter, it may be stated that there is a real preference for this machine. If seven selected the same typewriter, it could be stated that the preference was highly significant (odds of better than 99:1). On the other hand, if only five choose a particular machine, it could not be stated that there was a real difference in preference.

Example B. Where large numbers are used, it is possible by the triangular method to have two preferences. For example, three brands of soluble coffee are offered to 100 taste-testers. Forty-nine prefer coffee A; 45, B; 6, C. Entering Table II at 100 comparisons, we find that there are real preferences for coffees A and B (odds of 999:1 and 19:1 respectfully) over C. However, we cannot assume that coffee A is significantly better than B, since, according to Table I, more than 55 out of a total of 90 comparisons would be required for significance, whereas in this case we have only 49 choices out of 94.

Multiple Comparison

When we compare more than two items for variables, we may use a quick method described by Tukey.

Example A. Four varieties of corn each replicated in nine plots were harvested at the same moisture level and canned. The experimenter wants to know whether the quality of the canned corn, as measured by the alcohol insoluble solids (A.I.S.) method, will be the same for these four varieties, since they were all harvested at the same moisture level. We set up Table III according to the example given under the heading, "2. One Way Classifications," on page 1 of Tukey's publication.

There, we total each column, determine the range, (difference between lowest and highest value in each column) and find that the sum of ranges equals 6.1. Since we have 4 varieties and 9 replicates, the number of groups is 4 and the number in each group is 9. We then enter Table IV and find the following for number of groups (4), and number in each group (9):

0.96	0.73
1.22	0.98

Multiplying by the sum of the ranges (6.1) we find:

5.9	4.5
7.4	6.0

If we are satisfied with a 5 percent level of significance (odds of 19:1), the value of 5.9 may be used to determine whether the varieties are significantly different. Examining the totals we find that the difference between the smallest

* Frank Wilcoxon. *Some Rapid Approximate Statistical Procedures.* American Cyanamid Corp., New York City, 1949.

TABLE VIII—EVALUATION of Judges

1 Judges	2 Range of Totals	3 Significance (5 Percent Level)	4 L.S.D. (5 Percent Level)
A	15	10.1	7.8
B	4	12.0	9.2
C	14	4.6	3.6
D	10	6.4	5.0
E	14	7.4	5.7

TABLE IX—TESTING the Judges

	Judges					
	A	B	C	D	E	Range Total
Judge totals:	79	78	82	97	75	
Ranges:	15	4	14	10	14	57
Means (÷24):	3.3	3.3	3.4	4.0	3.1	

TABLE X—EFFECTS of Blanching Times on Flavor (5 Judges)

	Blanching Treatments (Sec.)				
	20	40	80	160	Range Total
Totals:	76	86	124	124	
Ranges:	7	10	11	8	36
Means (÷ 30):	2.5	2.9	4.1	4.1	

TABLE XI—EFFECTS of Blanching Times on Flavor, Checked Without Judge B

	Blanching Treatments (Sec.)				
	20	40	80	160	Range Total
Totals:	58	65	106	104	
Ranges:	7	7	6	4	24
Means (÷ 24):	2.4	2.7	4.4	4.3	

(Ioana 176.6) and the highest (N. G. 196.5) is considerably greater than 5.9. Hence, we may conclude that the alcohol insoluble solids of these varieties is not the same.

We may then use the value of 4.5 to determine individual differences among varieties. And, although the moisture content of all the varieties was the same when they were harvested, we come to the conclusion that (1) the alcohol insoluble solids of the N. G. variety is significantly higher than that of the others; (2) of the G x B variety is lower than that of the N. G. variety but higher than that of the remaining two varieties; (3) of the Shoepeg variety is significantly lower than that of the first two but higher than that of the Ioana, and (4) of Ioana is lowest.

If the data above were yield data, or percent culls, the conclusions would be identical.

If, in addition to differences among varieties, we were interested in difference among replicates, the data could be worked to give us those results by methods described under the heading, "3. Two Way Classifications," on pages 3 and 4 of Tukey's work. Procedures for analyzing data from Latin squares are also presented.

Correlation Coefficients

Where it is desirable to know what relationship exists between two machines or procedures, correlation coefficients are useful. For example, the tenderometer is used to measure the quality of raw peas for canning, and the processor wishes to know just what the quality he will get in the finished peas. If there is a good correlation between the tenderometer values on the raw peas and the quality of the canned peas as determined by alcohol insoluble solids, the processor could then be assured that, if the tenderometer value is satisfactory, the quality of the finished product will also be satisfactory.

In another example, tomatoes coming to a plant are graded for quality by U. S. Graders and the price paid to the grower is determined by his quality grade. The processor wants to know whether this grade actually reflects the quality of the finished product, and to what extent.

Correlation coefficients always result in values from 0 to + 1.0 or −1.0. One of 0 or near 0 indicates that there is little or no relationship between the two measurements that are being compared. On the other hand, correlations that approach + 1 indicate that there is a close positive relationship between the two sets of data. A coefficient approaching −1 indicates that there is good negative correlation between two sets of data. Table V shows what correlation coefficients must be before they can be considered significant and not due to chance alone.

For determining correlation coefficients we may use a ranking procedure that is much simpler and more rapid than the classical least-square method. In fact, where relationships are not linear, this ranking method will be even more precise than the least-square method.

Example A. A processor wants to know whether the tenderometer readings on his raw peas actually predict the quality of the canned product. Twenty samples are obtained. A tenderometer reading is noted and the remainder of the sample is processed in the usual manner. The canned peas are then examined by the alcohol insoluble solids method. A table for calculating correlation coefficient is set up (Table VI).

Sample code numbers are placed in Column 1 in order of increasing tenderometer values, which are then entered in Col. 2. The A.I.S. percentages for canned peas are placed in Col. 4. Tenderometer values are then ranked, beginning with the lowest value as 1 (Col. 3). And, similarly, the A.I.S. percentages are ranked in increasing value in Col. 5. In Col. 6 the difference between ranks in Cols. 3 and 5 are entered, and in Col. 7, these differences are squared. The correlation coefficient is calculated according to the following formula:

$$\text{Rank correlation} = 1 - \Sigma \frac{d^2 \times 6}{n^2 (n-1)}$$

Since n = 20, and Σd^2 equals 41, then this rank correlation $= 1 - \frac{41 \times 6}{20 \times 20 \times 19} = 1 - \frac{246}{7{,}600} = 1 - .033$, or .967. This correlation is very close to 1.

Referring to Table IV, we find that with 20 comparisons, a correlation of .56 would have been significant at the 1 percent level. In general, for prediction purposes, mere significance is not sufficient.

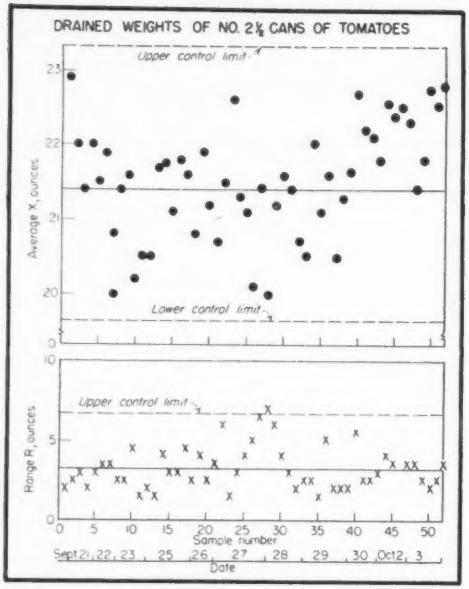
Normally, a correlation coefficient of .9 or better is desirable. Since the above correlation is higher than .9, it is unquestionably significant. It may be concluded that the tenderometer values on raw peas predict, with very good accuracy, the quality of the canned product as determined by alcohol insoluble solids.

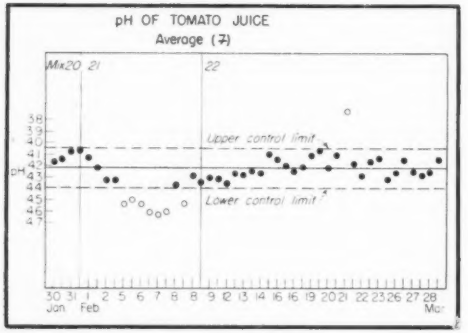
Coefficient of Determination

Square of the coefficient of correlation is termed the coefficient of determination. Thus, in the above example where the coefficient of correlation was .967, the coefficient of determination is .935. This means that 93.5 percent of the variability in quality of the canned product could be attributed to factors associated with variations in tenderometer values of the peas, with 6.5 percent due to other causes such as differences in material itself, precision of measuring instruments, or differences in handling operations.

This coefficient of determination, therefore, may be used in general to determine to what extent any particular raw

Control Charts Indicate Trends


DRAINED WEIGHTS OF NO. 2½ CANS OF TOMATOES
Upper control limit
Lower control limit
Average X, ounces
Upper control limit
Range R, ounces
Sample number
Date
Sept 21, 22, 23, 25, 26, 27, 28, 29, 30, Oct 2, 3



THEY quickly point out need for processing changes. Top: Canned tomato filling operation is in control as indicated by drained weight samples falling between upper and lower control limits. Above: pH of tomato juice went out of control when circles fell below lower limit line.

material, condition, equipment or handling procedures affect the finished product.

For example, records may be taken of the temperature of the water in the cooling canal and of percent spoilage in the finished cans. The correlation coefficient will indicate whether the temperature of the cooling canal water, or any factors associated with it, have a significant effect on amount of spoilage in the canned product. The coefficient of determination will indicate spoilage due to water temperature as against that due to other causes.

Applied to Taste Panel

When other methods for quality control procedure are not satisfactory, resort is taken to taste-testing panels. They can be a precise tool if: (a) Properly designed; (b) care is taken in selection of judges; (c) proper physical facilities are available, and (d) statistical analyses are used for interpreting the data.

These statistical analyses have already been described. We shall now demonstrate their application to taste-testing.

There are two types of taste panels, namely, the difference test and the preference test. In the former, the purpose is to distinguish differences in samples to as minute a degree as possible on the basis of intensities. For example, if the hardness of peas is to be evaluated, the difference panel will score the samples on the basis of degree of hardness entirely, without indicating which degree of hardness they prefer.

In the preference test, however, judges indicate personal preferences. Here, the individual judge will indicate his preference for a particular sample of peas. In this case, one judge may prefer relatively harder peas while another may prefer more tender ones. Both judges are correct, even though they differ in their choice of sample, since they are expressing an opinion of preference rather than difference.

These two types of tests may be combined into a difference-preference test where each judge first scores the peas in accordance with their degree of hardness but also indicates which sample he prefers.

In general, taste panels that are used as quality control, or laboratory instruments, are usually of the difference rather than the preference type, while consumer-survey panels generally consist of the preference type.

Setting Up the Panel

From the statistical standpoint it is essential that each judge's score be arrived at independently. Where the panel members discuss the samples and agree on a score, results can be analyzed statistically, but much precision is lost because individual scores are not available.

It is advantageous, although not at all essential, that judges be isolated in separate compartments. Facilities should be arranged in such manner that there is little or no communication between them. Such communications are not limited to verbal expressions, for they also include visual expressions, and other means of communicating approval or disappproval of particular samples. Samples may be offered either in a particular order determined in advance or completely at random.

Selection and Evaluation of Judges. For preference testing, judges should be selected entirely at random, except in the case of elaborate consumer surveys, where attention should be given to such factors as economical status, age, sex, race, and community size and location.

For difference or difference-preference testing, where the panel is to serve as an analytical tool, it is advantageous to have the most precise tool possible at minimum cost. For this purpose, judges should be selected on the basis of the following three criteria:

1. How well can they detect differences—i.e., how small a difference can they detect? Obviously if a number of judges are available, each of whom can detect every minute difference, they will be much more efficient than another, perhaps larger, group that cannot detect such small differences.

2. How consistent are they—i.e., how well can they repeat themselves on duplicate samples?

3. How do they compare to panel average? That is, are they inclined to score everything too high or too low? Except where actual grades are based on these panel scores, this criterion is of least importance, so long as the judges are consistent and show a high degree of discrimination.

Methods used for evaluating the judges for these three criteria will be discussed later.

Scoring. The simplest type of score would be one where the judge chooses one of two or more samples without assigning actual numerical values. As demonstrated previously, this type of data by attributes is less efficient than variables data where actual numerical values are assigned.

Score cards for variables should include enough discreet units to allow the individual judge to use his maximum discriminatory ability. If, for example, canned samples are evaluated on a scale of 4, with 1 being equal to substandard, 2 to standard, 3 to extra-standard, and 4 to fancy, such a score card would reduce the amount of information that can be obtained from such a panel.

It would, therefore, seem preferable to use a score of 1 to 10, where 1 would be substandard; 2, 3, 4 would be equivalent to increasing quality levels in the standard range; 5, 6, 7 increasing quality levels in the extra-standard range; 8, 9, 10 increasing quality levels in the fancy range. On the other hand, if the judges are unable to distinguish more than four categories, the availability of a large number range may lead to confusion.

Paired Comparisons

This method may be used to test the ability of individual judges to detect differences (Criterion 1) or significance of the difference between two products.

Example A. The problem is to measure ability of a number of candidates for a taste-testing panel to be used to distinguish differences in aroma of various blends of apple juice. Judges are given 20 sets, each set consisting of three samples in which two are the same blend and one is different. One of the paired samples is identified, and the judges are asked to select the other one that is similar to it.

Referring to Table I (paired comparisons) we find that 15 correct selections are required for significance at the 5 percent level. Hence, those judges who selected the proper samples in 15 or more of the 20 sets may be considered to have demonstrated a significant ability to detect differences in apple juice aroma. These candidates may therefore be retained as judges for the panel, while the candidates failing to select the right sample 15 out of 20 times may be dismissed.

If too many judges are dismissed, more than 20 tests may be made, or the difference between the two blends may be increased. If too few judges are dismissed, the difference between the two blends can be reduced.

Sequential testing can also be applied to this problem. Each judge may be given sets of three samples continuously until he shows significance in selecting the proper sample. For example, if a judge makes 6 proper selections on the first 6 sets, he qualifies immediately. If he misses 1 of the first 6, but judges the next two correctly, he qualifies at the next level. If he misses 2 in the first 8 but misses no more until he reaches a total number of 12 comparisons he may qualify on that level, and so on. This procedure will provide an opportunity for ranking the ability of the judges.

Example B. The identical test may be used to determine whether there is a significant difference between the two blends of apple juice. In this case, we assume that the judges are satisfactory. Then, if 20 judges select the proper sample 15 times, or if a smaller number of judges is provided with more than one set of samples so that a total of 20 comparisons is made, and they make 15 or more correct selections, we may assume that there is a significant difference between the two blends.

Example C. If a preference test is made on these two blends of apple juice, it is not necessary to have three samples (two of which are the same), but only two samples that are different from each other. Judges are then requested to indicate which sample they prefer, and the significance of their selections can be determined by reference to the same paired comparison table.

Triangular Comparisons

For purposes of taste-testing panels, the triangular tests are decidedly more efficient (by 50 percent) than paired comparison tests. They may be handled in exactly the same manner—that is with every set consisting of three samples of which two are the same and one is different. However, one of the paired samples is not identified, and instead of being told that he is to select the sample which is similar to the identified sample, the judge is asked to select the odd sample. Thus, his chances of selecting the right sample by chance alone are only 1 in 3, whereas in the paired comparison method, his chance is 1 in 2. The significance of the judge's results may be determined by reference to the triangular comparison table.

Multiple Comparisons

For determining significant differences among three or more comparisons, we may use ranking procedures such as described by Wilcoxon. But because of the limited numbers on most score cards, many ties are bound to occur, so that it is preferable to use Tukey's method, which

TABLE XII—CORRELATION COEFFICIENTS Between Duplicate Scores For Judge A

1	2	3	4	5	6
		Duplicates			
a		b			
Score	Rank	Score	Rank	2–4 (d)	d^2
1	1	2	2	1	1
2	3	2	2	1	1
4	6	2	2	4	16
1	1	2	2	1	1
2	3	2	2	1	1
3	5	4	7	2	4
4	6	5	10	4	16
5	9	4	7	2	4
5	9	5	10	1	1
5	9	4	7	2	4
5	9	5	10	1	1
4	6	1	1	5	25
					$\Sigma d^2 = 75$

$$P = 1 - \frac{75 \times 6}{12 \times 12 \times 11} = \frac{1 - 450}{1,584} = 1 - .28 = .72$$

TABLE XIII—CORRELATION COEFFICIENTS Between Duplicate Scores For Judge B

1	2	3	4	5	6
		Duplicates			
a		b			
Score	Rank	Score	Rank	2–4 (d)	d^2
3	4	4	6	2	4
1	1	2	2	1	1
5	11	3	5	6	36
5	11	2	2	9	81
4	8	4	6	2	4
3	4	4	6	2	4
2	2	2	2	0	0
3	4	5	12	8	64
2	2	4	6	4	16
4	8	1	1	7	49
3	4	4	6	2	4
4	8	4	6	2	4
					$\Sigma d^2 = 267$

$$P = 1 - \frac{267 \times 6}{12 \times 12 \times 11} = 1 - \frac{1,602}{1,584} = 1 - 1.01 = -.01$$

amounts to a "quick, and not so dirty," equivalent of the analysis of variance. We may also use the same method to evaluate candidates on their ability to detect differences (Criterion 1) and how closely they come to the average panel score (Criterion 3).

Example A. Five candidates for a taste-testing panel of frozen asparagus are supplied with 6 sets of samples. Each set consists of 4 samples that have been blanched for 20, 40, 80 and 160 sec. Candidates are asked to score the samples on a scale of 1 to 5, where 5 indicates no off-flavor; 4, trace of off-flavor; 3, questionably acceptable; 2, unacceptable because of off-flavor, and 1, offensive off-flavor. Each set of samples is offered to a judge at random, but results are arranged in order (Table VII).

Since in the case of each judge there are 4 groups and 6 replicates in the group, we enter Table IV and find:

.92	.71
1.21	.96

. . . and decide to use the upper values, which indicate significance at the 5 percent level.

We then set up Table VIII. In Column 1 we list the judges; in Col. 2 the range among the totals for each judge—that is, the difference between the lowest and highest total. Figures in Col. 3 are obtained by multiplying the total of ranges for each judge by .92—the 5 percent significance level factor (Table IV).

Judge B Is Dropped

Data in Col. 4 are calculated by multiplying the total range for each judge by the factor of .71 obtained from Table IV for determining the least significant difference (L.S.D.) between totals. Since the range of totals (Col. 2) for all the judges except B is greater than the significance required at the 5 percent level (Col. 3), we may conclude that these judges showed real ability to distinguish among the four blanching treatments. Judge B, however, does not show this ability and should, therefore, be dropped from the panel.

Turning to Col. 4, we find the L.S.D. for Judge A to be 7.8. Referring back to his totals, we may conclude that he was able to separate samples blanched for 20 or 40 sec. from those blanched 80 or 160 sec. But he was unable to show significance between those blanched 20 sec. and those blanched 40 sec.

Judge C, on the other hand, (L.S.D. 3.6, Col. 4) was able to demonstrate that the 40-sec. blanch was superior to the 20-sec. one, and that the 80-sec. was superior to the 40-sec., but not that the 160-sec. blanch was different from the 80-sec. one. It could, therefore, be concluded that C is a superior judge. A, D, and E, are acceptable judges, but B is not acceptable.

Example B. If we arrange the data in another manner and obtain the judge totals for the four treatments, we have Table IX, which gives the opportunity of testing the judges to determine whether any of their scores are too high or too low.

Entering Table IV (for 5 groups and 4 within the group) we find the two upper figures of .85 and .58. If we multiply the total range of 57 by .85 we obtain 48, which is considerably higher than the difference (22) between the lowest total of 75 and the higher total of 97. Therefore, we conclude that the judges do not differ significantly in their average scores, and so they are all acceptable from the standpoint of not being consistently too high or too low.

Example C. Assuming the judges are satisfactory and we want to know if these blanching treatments have an effect on flavor, we would obtain our totals and ranges for the four blanching treatments from Table X.

Turning to Table IV, we find for 4 groups and 5 within the group the factor of .94 for significance at 5 percent level, and the factor of .72 for the least significant difference. Multiplying the range total of 36 by .94, we obtain the value of 33.8.

Since the difference between the lowest blanching treatment total of 76 and the highest of 124, is 48, we may conclude that there is a significant difference in flavor resulting from these treatments. Multiplying the range total of 36 by the L.S.D. factor of .72, we obtain a value of 25.9. Examining the total for the four treatments, we find that the 20- and 40-sec. blanches are not significantly different, nor are the 80- and 160-sec. treatments significantly different. However, there is a significant difference between the two low treatments as compared with the two high ones.

We had decided above that Judge B was not satisfactory. If we should eliminate the data provided by him, we find that the differences between the four blanching treatments are accentuated as shown in Table XI.

Correlation Coefficient

One common application of the coefficient of correlation to taste-testing panel data is to evaluate judges as to consistency—how closely they repeat their own results on replicate samples. We may take the same data for the 5 judges and pair them, obtaining three pairs from each set of 6 replicates. We may then proceed to obtain a correlation coefficient for each judge as shown in Table XII.

The significant correlation of .72 indicates that Judge A was quite consistent in his grading of duplicates.

Analyzing Judge B's data similarly, we set up Table XIII.

Since the correlation coefficient between duplicates for Judge B is almost 0, it may be concluded that he failed completely in identifying duplicate samples.

Experimental Design

In cases where comparisons are to be made among a large number of samples, but ability of the judges is limited to testing no more than a very small number at one time, it is frequently possible to set up experimental designs to test a portion of the total samples at one time, eventually enabling cross-comparisons among all the samples. Many such designs are presented by Cochran and Cox*. Here we shall suggest only one such arrangement. It is very simple, although by no means the most effective.

Let us assume that the judges can test only four samples of orange juice at one time and the problem is to compare eight different brands of frozen orange juice. We may decide to replicate the test four times. For each replication all eight samples are randomized. Then the judges are given four samples to test at any one time. The first such set consists of the four brands which happen to have been chosen first for each of the four randomly arranged replications. The second set will consist of the four brands which were chosen second, etc.

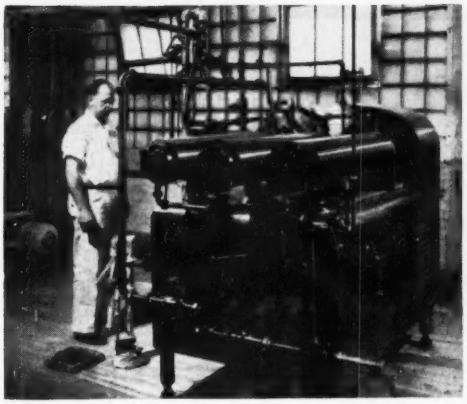
Some relatively simple statistical procedures for evaluating food plant operations have been presented above. These methods do not in themselves improve the quality of the product, but they point up the problems, and indicate whether or not any particular process is in control.

Equipped with such data, the processor can then make intelligent decisions toward bettering his product, on calculated risk, instead of merely basing his moves on vague feelings and possible biased opinion.

* W. G. Cochran, and G. M. Cox. *Experimental Design*. John Wiley & Sons, Inc. New York City. 1950.

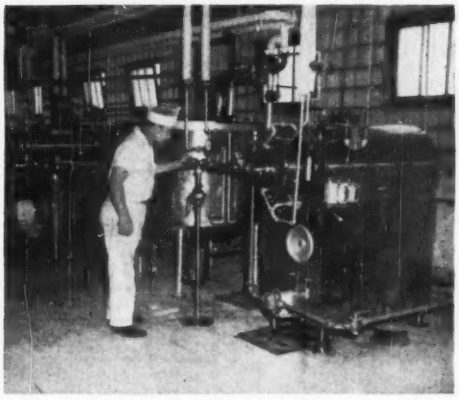
The above article comprises Miscellaneous Publication No. 147, Contribution No. 2396, of the Maryland Agricultural Experiment Station, Department of Horticulture.

***Non-stop* syrup cooling . . .**



HOT syrup-gelatin mix is continuously cooled in this Votator-type mixer-cooler. Syrup is fed from each cooler to three continuous Oakes mixing machines (see right).

. . . and 'mallow mixing



THIS continuous mixer turns out 2,200 lb. of marshmallow per hr., or 13,200 lb. for the six mixers. Air going into the enclosed mixers is cooled and filtered.

6 *Mixers* Do the Work of 28

—in Midwest confectioner's striking switch from batch to continuous. And in 1/3rd the space . . . Also featured on advanced marshmallow line are specially engineered starch conditioner, centrifugal air scrubber

W. R. HOLTZ
Chief Chemist, The Cracker Jack Co., Chicago

Process-line revamping has paid off in plus-performance and improved product uniformity since our firm modernized marshmallow-candy production at its Chicago plant.

First of all, by replacing 28 batch-type beaters with only 6 continuous, enclosed mixers, we are now able to turn out the same volume of marshmallow—over 13,000 lb. per hour—with more than a 60 percent saving in floor space. And this new marshmallow is of more uniform quality.

Second, the hot syrup-gelatin mix is now continuously cooled in two mixer-type heat exchangers. Each unit, in turn, feeds three continuous mixers.

And finally, starch for casting marshmallows is now being treated in a specially designed continuous conditioning unit with double the capacity of the former equipment. This new conditioning system features more efficient conveying, sifting, cooling, and drying of the starch. Also there are new safety and control devices. Moreover, the small amount of starch dust not trapped in the cyclone is removed by a special, centrifugal air scrubber.

Of special note, too, are the new packaging techniques employed to protect quality of our popular Campfire brand marshmallows during transit and storage as well as on the consumers' shelf.

Let us now detail the various operations in our marshmallow department, noting, as we go along, the advanced practices that have brought about the better performance and higher quality.

Preparing the Syrup

Feeding of ingredients—sugar, corn syrup, and water—has been facilitated through installation of pre-set flow meters and a monorail-mounted sugar-handling bin. Corn syrup and water are directly metered into four 1,000-lb. capacity stainless steel cooking kettles equipped with steam coils and vertical, propeller-type agitators. Sugar is scaled into the 300-lb. capacity stainless bin. This bin travels on the overhead monorail at a 45 deg. angle. It is equipped with a side-opening gate for charging the sugar into the kettles.

First, sugar and water are cooked, then the corn syrup is metered into the batch. Next, the batch is pumped into three 2,000-lb. capacity stainless steel combination mixing-cooling tanks. Here, a prepared gelatin solution is introduced when the syrup has cooled to 140 deg. F.

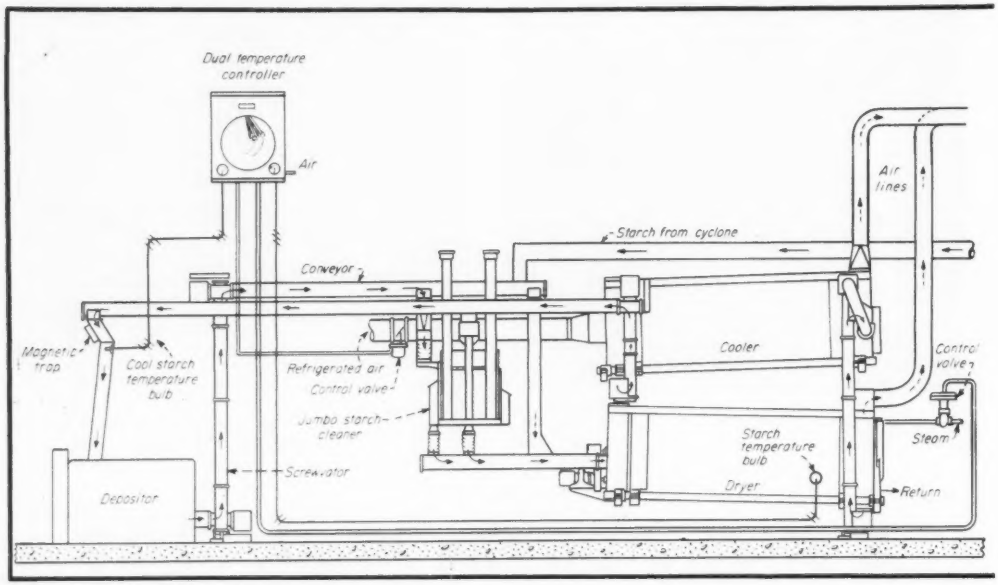
The cooling is accomplished in these tanks by three methods: Mixing with propeller-type agitators, bubbling air from the bottom of the tanks, and using cold-water coils.

Continuous Cooling Mixing

Now, the gelatin-syrup mix is pumped into a 9,000-lb. capacity stainless mixing-holding tank, equipped with a horizontal propeller-type agitator. From here, the flow is continuous through two Votator mixer-coolers, each feeding a 1,000-lb. capacity surge tank which in turn supplies three continuous Oakes mixers.

Continuous cooling of the syrup-gelatin mix to about 110 deg. F. in each jacketed, insulated, three-cylinder Votator mixer-cooler is at a rate of

←Here's How Starch Is



SPECIAL starch recovery and scrubbing system. New Huhn conditioner (left panel) now handles twice the amount of

6,600 lb. per hr. These jacketed cylinders are cold-water refrigerated.

Surge tanks supplying the continuous mixers are equipped with propeller-type agitators. The syrup-gelatin mix is now pumped from the surge tanks under 60 psi. into lines feeding the continuous mixers. Just before entering the mixing chamber, air and ingredients unite. Compressed air, under 125 psi., passes through a reducing valve, where it drops to 60 psi. before mixing with the syrup-gelatin blend. Air emitted into the mixing head is filtered and cooled. In this way, possible dust, oil, or moisture are kept out of the mixing chamber. The mixing chamber is jacketed and cooled with running cold water.

Finished marshmallow is then discharged from each mixer under 40 psi. at the rate of 2,200 lb. per hr. Sanitary, stainless steel pipes, valves, and fittings are used throughout.

Automatic Depositing

'Mallow is pumped from the continuous mixers to seven depositors. Each unit deposits marshmallows 140 to a tray at the rate of 14-16 trays per minute.

Trays are automatically stacked, then hauled into two 100,000-lb. capacity, air-conditioned, curing rooms. Temperature and relative humidity of these rooms are automatically controlled. The temperature is kept at about 72 deg. F. and the humidity at 50-55 percent.

As a safety precaution, seven vacuum outlets have been installed throughout the depositing room for easy, on-the-spot removal of starch dust from walls, floor, and equipment.

After the 'mallows are cured 24-hr., trays are transported to the depositors, where they are automatically dumped. Marshmallows are then screened, coated with finely pulverized sugar, and bucket-conveyed to the air-conditioned packaging department.

Efficient Starch Cleaning

A specially designed Huhn starch-conditioning system has been installed with more than double the former capacity. New figure: 8,500 lb. of starch per hour.

Basically, operation of the new unit is similar to that of the former equipment, but performance has been greatly improved and maintenance simplified. For one thing, conveying and sifting of starch are now more efficient. Also, new controls have practically made the unit automatic. Safety devices have been incorporated according to suggestions from insurance underwriters.

Here are details on the highly efficient method of conditioning the starch:

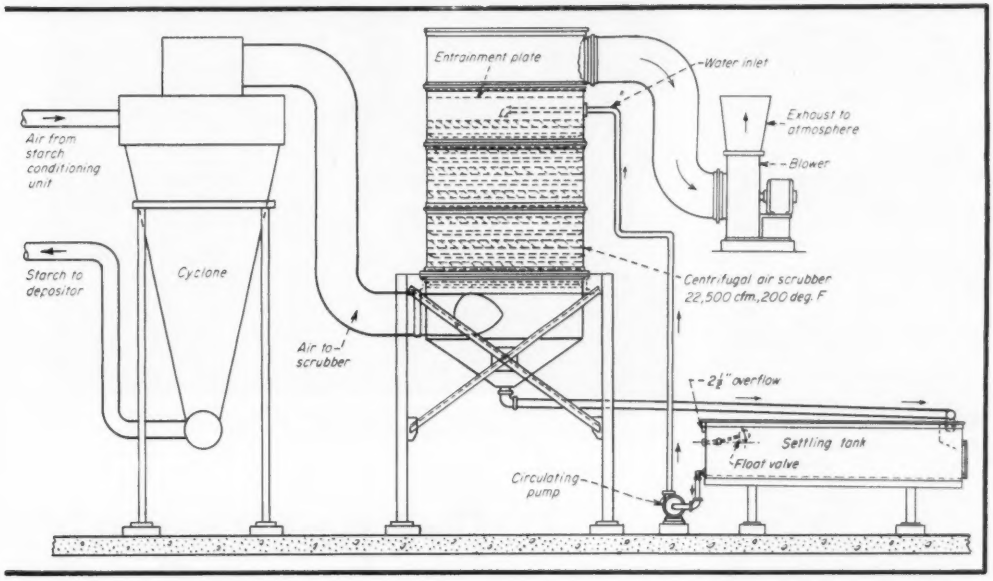
From depositors, the starch is conveyed to a gyrator sifter with 24-mesh wire screens. Movement of the starch is by a specially designed 6-in. standard-pitch screw conveyor ("Screwvator" made by Huhn) which is hooked up with two conventional horizontal screw conveyors. This new vertical-type screw conveyor was designed for minimum ceiling and floor clearance of the two conventional conveyors, and it occupies less space than ordinary bucket elevators.

Removed by the sifter are foreign materials, particularly tailings left in the starch at the time the goods are deposited. An automatic by-pass operates when the cleaner is overloaded.

New Starch Dryer

Sifted starch is now conveyed to the new dryer, which is 15¼ ft. long, 4⅝ ft. high, and 5¾ ft. wide. The dryer consists of a revolving cylinder, steam tubes, scraper, hoppers (front and rear), and motor drives. The cylinder is 10 ft. 5¾ in. long and its inside diameter is 3 ft. 9½ in.

Attached to the inner shell of the cylinder are flights that lift the starch from bottom to top, permitting it to fall onto 50 double steam tubes. To prevent starch build-up on the tubes, an aluminum-alloy scraper travels through the entire length of the cylinder. Inside area of the cylinder



starch of former unit. Starch dust not recovered by cyclone (right panel) is disposed by centrifugal air scrubber.

is twice that of the former one, and the number of steam tubes has been increased to provide about 70 percent additional heating surface.

Cooling with refrigerated air is next. Starch is now conveyed to the continuous cooler, which is located directly above the dryer. Basically, the cooler is similar to the dryer. Instead of the steam tubes, there is a cylindrical-type screen inside the revolving cylinder.

Cooled starch is now conveyed to the depositors. A permanent-magnet trap on the return spout (from conditioning system to depositors) removes metallic objects from the conditioned starch.

Air System in Dryer and Cooler

Room air enters the dryer through a screened opening in the front hopper. As the air passes through the unit, it picks up moisture from the starch and a small amount of dust. Air moves through the dryer parallel to the flow of starch. This air is then carried to a cyclone-dust collector, (minimum velocity 3,400 ft. per min.).

A manually operated bleed valve at the discharge end of the dryer varies the amount of moisture removed from the starch. If less moisture is to be removed, this valve is opened the required distance. As a result, room air enters the cyclone duct and reduces the amount passing through the dryer.

In the cooler, flow of refrigerated air is countercurrent to the movement of starch. Prior to entering the rear of the cooler, air passes through refrigerated coils. And, in traveling through the cooler, refrigerated air cools the starch and also picks up moisture as well as dust on its way to the cyclone.

Temperature of the starch discharged from the cooler is maintained at a constant level by automatically varying the amount of cold air entering the unit. Mounted on the rear of the cooler is a butterfly-type damper positioned by an air motor. A proportioning controller operates this motor to keep the temperature of the starch at ± 1 deg. F.

If there's a drop in amount and velocity of air entering the cooler, starch dust will then build up. For this reason, an automatic static damper is installed in the front hopper to provide an air velocity in the lines equal to the former velocity even though the butterfly damper throttles the cold-air intake.

Approximately 90 percent of the starch dust is recovered in the cyclone. This starch is then conveyed to the depositors.

Remaining starch dust is removed by a continuous Bartolucci air scrubber. Air laden with the residual dust is carried through a duct to the bottom of the unit. Traveling upward through a series of horizontal perforated plates, it mixes with a falling stream of water to form a low-density slurry which then drops into a V-bottom tank.

The slurry now flows into a rectangular tank, where it settles and is then flushed into the sewer. Water is re-used—being circulated from settling tank back into air scrubber. And air is exhausted from the scrubber into the atmosphere.

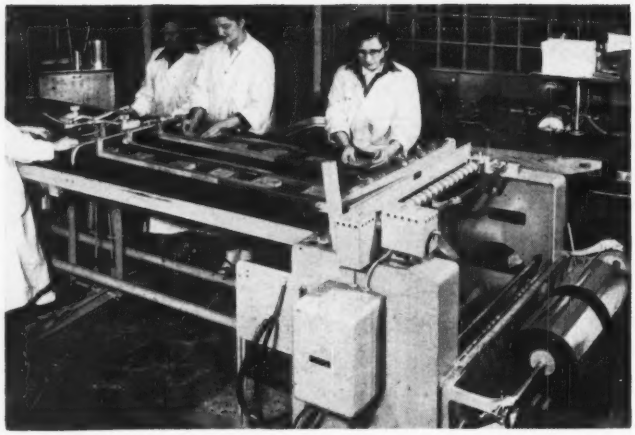
The Control System

The new continuous Huhn starch-conditioning system is equipped with an automatic, dual, air-operated controller. Control valves have been installed at two inlets—where steam flows into the dryer and where refrigerated air enters the cooler.

The control system keeps the temperature of the dryer constant, thus maintaining a uniform moisture content in the starch. Also controlled is the temperature of starch coming out of the cooler.

This dual controller is equipped with a two-pen recorder, each pen actuated by a temperature bulb—one in the dryer, the other in the return spout from the conditioning system. Thus, there's a constant check on temperature of starch in the dryer and in the return spout.

(Turn to page 196)



IN PREPACKAGING Peters luncheon meats, girls cellophane-wrap stacked slices. Film is machine-cut into sheets. Packages are then spot-sealed.

Prepackaging

Meat packers are putting up more and more consumer-size packages of cured and smoked items. Trend is to labor-saving techniques. Automatic packaging units and protective wraps featured . . . Peters operation spotlighted

FE STAFF

Prepackaging of cured and smoked products—such as luncheon meats, bacon, frankfurters, and sausages—is gaining striking momentum.

There's no mystery about the continued expansion here. Developments of specialized techniques, involving new packages, new machines, and even new products, are all powerful prepackaging promoters.

Significant here has been the gradual, but growing, trend to the installation of semi-mechanized lines featuring automatic meat-slicing and stacking machines, conveyers, wrapping and sealing units, and volumetric type stuffers for putting up the packet items.

Primary reasons behind the swing to prepackaging of more meats at the packers' level have been twofold: (1) To relieve congestion at the meat-service counter (a major bottleneck in supermarkets interfering with store traffic); and (2) to satisfy the mounting consumer preference for products protectively packaged in uniform, convenient portions.

True, some retailers have been doing their own prepackaging of sliced luncheon meats. But more and more packers are now taking over this work, adding it to their routine of prepackaging sliced bacon, frankfurters, link sausages, smoked hams, and shoulders. By relieving the retailer of some of his prepackaging operations, more store personnel can be freed to cut fresh meats—steaks, chops, stew meat and roasts—and then prepackage them in ready-to-pick-up, consumer-size portions.

Typical of how a meat packer can take some of the load off the retailer's back are prepackaging operations at Peters Sausage Co. in Detroit. This aggressive packer quickly recognized the big potential in meat prepackaging and forthwith entered the field "in force" with a complete prepackaging program. The extent of these operations is indicated by the bevy of labels in our accompanying panel illustrations.

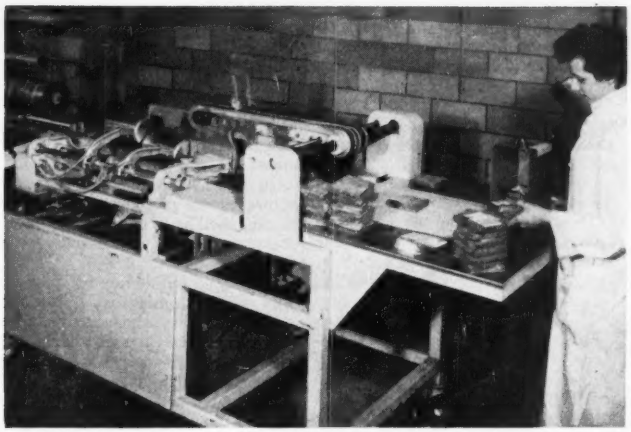
Flexibility is the outstanding feature of the newly designed prepackaging line that Peters recently put into operation. Incorporated here is a dual-unit machine—the Corley-Miller sheeter and wrapper—which turns in a high performance, packaging hourly over 2,100 packages of meat.

Originally, this line was used to cellophane-wrap sliced luncheon meats in 8-oz. portions. Now, the line is interchangeable. With slight modifications, it is used for prepackaging sliced bacon, frankfurters, and link sausages.

This firm is also preparing midget items, machine-stuffing meat spreads into plastic tubing in 10-oz. units.

Sliced Luncheon Meats

In prepackaging sliced luncheon meats, girls first prepare the slices. Two meat loaves are fed into a U. S. slicing machine, which automatically cuts and double-stacks 128 slices per minute. The thickness of the cut is adjusted to assure a uniform number of slices for each 8-oz. stack. Each stack is then mounted on a cardboard



NEXT, pre-wrapped packages are machine-wrapped and heat-sealed. Hourly production is 2,100 packages. Line is also used for wieners, sausages, bacon.

Is Fanning Out

backing that provides rigidity and insulation during the wrapping and sealing operations.

Stacks of sliced luncheon meat are now conveyed to the sheeter. Here, the meats get a pre-wrap and the film a spot-seal.

The sheeter automatically cuts roll-fed cellophane into two sheets and feeds them to a conveyor that carries them to the packers. Cellophane is fed from a single or double roll. If a single roll is used, then a knife slits it lengthwise. A second knife, actuated by electric eyes that spot registration marks on the film, cuts the two lengths of cellophane into sheets of the desired length.

Four girls, two on each side of the conveyor, place a printed label over the cardboard backing and then pre-wrap each stack of slices with a sheet of cellophane. Two other girls, using foot-pedal operated heat-sealers, spot-seal the wrapper. Still another girl now transfers the packages to the wrapping and sealing machine.

A chain-belt conveyor with metal flights spaces each package in timing with oscillating end-sealing plates. As the packages continue to the end-sealers, two sets of vertical metal fingers fold the ends of each wrapper, and the end plates complete the seal. Another set of vertical fingers pushes the package to a bottom-sealing plate, where two sets of five vertical rolls move it across the heat-sealer.

The 8-oz. packages are then packed into cartons, which are held in a 36-40 deg. F. room, ready for shipment.

Sliced items comprise the round meat varieties, loaf goods, and square-shaped meats. Round varieties include bologna and cooked salami. Loaf goods are veal, olive, pepper, Dutch, barbeque ham, macaroni and cheese, combination (meat and cheese), mock chicken, and pickle and pimento. Square-shaped cuts comprise liver, tongue, 4-in-1 loaf, cooked pork loin, honey-style meat, head cheese, and cooked salami. Boiled ham slices are also prepackaged.

The smaller beer salami is packaged in two stacks, and Canadian bacon is shingle-stacked.

Also, this packer is now processing a new type of bologna—a square-shaped product specially designed for sandwiches. This product is also sliced and prepackaged in 8-oz. units.

In preparing the 4-in-1 loaf, four varieties of luncheon meat are cut lengthwise in quarters in a miter box. Each quarter is then dipped in a gelatin solution and stuffed in Pliofilm tubing to form the 4-in-1 loaf. After the gelatin congeals, the tubing is stripped off, and the loaf is then sliced for prepackaging.

A word about the labels: The distinctive red, white, and blue label identifies the packer, variety of meat, weight, and price. Appearing on most labels is an appetizing colored picture of the product. Thus, the retailer may display the sliced meats labelside-up in self-service refrigerated cases and so prevent exposure-discoloration of the products.

Wieners and Sausages

Skinless frankfurters and sausages are also packaged on this line. Regular franks are packed nine to a pound, and Pee Wee's (the smaller franks) are put up twelve to a 10-oz. package. Both are double-layer packed.

Six girls, three on each side of the belt feeding sheets of cellophane from the sheeter, double-layer pack, pre-wrap, and spot-seal these packages. One girl places the first layer of franks on the wrapper, another the second, and the third spot-seals the film. Then the packages are fed to the wrapping and sealing machine.

Wee Porkies (small skinless, smoked pork sausages) and skinless Pee Wee Viennas are packaged in the same manner—ten to an 8-oz. package.

A novel package has been designed

to eliminate the need for automatic linking and tying of sausages stuffed in sheep casing. The 1-lb. length of stuffed sausage is wrapped around a rigid cardboard backing. Contact with the edges of the board produces links of uniform length. Each package is overwrapped with cellophane, then heat-sealed.

Sliced Bacon

Only the sheeter portion of the Corley-Miller line is used for wrapping sliced bacon. Two types of bacon are prepackaged—the regular, consisting of 24-26 slices per pound, and the heavily smoked country-style product cut to 15-18 slices per pound.

An Anco hydraulic bacon press squares and sizes the skinned bellies at a rate of 8 slabs per minute. Squared bellies are then fed to the Anco slicing and packing line.

Here, a Hydramatic type slicer cuts 650-800 strips of bacon per minute. As the slab is fed to the knife blade, it is automatically gripped. Slices emerging from the machine then go to the shingling section, where two grooved rolls, mounted on a swiveling yoke, drive the narrow shingling belts at about one-third the speed of the packing conveyor. An operator then separates the shingled slices in approximately ¼-or 1-lb. groups, and slides them to the packing belt.

On the packing line, seven girls weigh the bacon in ¼- or 1-lb. lots and pack them in heavily waxed or laminated trays. The girls weigh and pack on specially designed tables with recessed scales.

Trays are scored in the middle so that the consumer can fold each one to form protective top and bottom flaps after the cellophane wrapper has been torn off.

The trays of sliced bacon are then conveyed to the sheet-forming machine. Girls now overwrap each tray with a sheet of cellophane and heat-seal the film. Packages are then packed into cartons—twelve ¼- or 1-lb. trays to a carton.

Midget Items

Stuffing 10-oz. portions of meat spreads into Saran tubing is still another prepackaging operation that has fulfilled the retailers' need for additional consumer-size packages.

These self-service midget-style items include liver sausage, braunschweiger, sandwich spread (sausage meat, mayonnaise, pickles, pimento, and red pepper), corned beef, and mock chicken (veal, pork, and seasoning). Also prepackaged in midget form are jellied souse, chile con carne, and tuna fish salad spread (for Lent). All such items are ready to eat. The products such as liver sausage and braunschweiger are precooked in vats containing boiling water. These midget items are finally packed twelve to a carton.

Employed for stuffing meat spreads into plastic tubing is a Rockford volumetric filler, which is attached to a conventional sausage-stuffing machine. The filler consists of a T-shaped horizontal cylinder with two ends equipped with adjustable plungers and stuffing horns. Plungers can be adjusted to provide the desired fill.

Tubing is inserted over each horn. A hand-operated gate is opened, and the meat spread is then forced into the tubing. Meanwhile, meat is pressed into the other end of the cylinder, and the stuffing cycle is repeated. Periodically, the midget items are check-weighed to assure proper fills.

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LETTERS TO THE EDITOR

Electrostatic Grain Cleaner Criticized and Defended

Two Questions Raised

Editor, FOOD ENGINEERING:

I read with interest E. D. Andrews' article, titled "High Voltage Removes Filth" (July, 1952), and I find two points which I believe should be questioned . . .

First, on page 163, I find the comment: "Due to the high resistance of the electrical circuit involved, there is no explosion hazard from sparking with this machine . . ." In a high voltage circuit, resistance does regulate the amperage flow, but where you have a 30,000v. differential between a grounded electrode and a high-voltage electrode, there is always the possibility of an intense spark which can set off a dust or fume explosion or even set fire to finely divided chaff which may be present in the form of a layer of dry material.

The high-voltage metallic electrode is, in effect, one side of a condenser, and the surface charge which accumulates on the high-voltage electrode as it comes up to 30,000v. represents a very high accumulation of electrical energy. As long as this electrode is air-insulated by sufficient space from the grounded electrode, no sparking will occur, although at a sufficiently high voltage there will be a slight corona discharge, depending on the radius of the high-voltage electrode. If any material which is a good conductor (such as a piece of metal) comes through in the feed, or drops between the rolls from an outside source, the air insulating blanket will be reduced in thickness at the point where the metal goes through the rolls. And intense direct sparks will occur at that point.

If this spark occurs when there is no dust, chaff, or fumes present, all well and good. If it occurs when the 'right' conditions exist, at the least you will have a fire and you may have a disastrous explosion.

Second, under the subhead "Plans for Commercialization," Mr. Andrews tells of the arrangement to make this apparatus available under a fee and royalty basis, the implication being that this process is of such a restricted nature that royalties will apply. Actually, the use of electrostatic separation in the food industry dates back to the early 1930's. And any food processor who desires to purchase an electrostatic separator outright, without any royalty entanglements, is perfectly free to do so.

Also, if he wishes to avoid danger of explosions and fires due to spark discharge, he can use a machine fitted with dielectric electrodes in which each unit of charge is isolated on the surface of the dielectric so that no condenser surge is possible at a point of local shorting or grounding. This dielectric electrode is covered by U.S. Patent 2,225,096, of December 17, 1940.—*H. L. Bullock, Bullock-Smith Associates, New York City.*

Here Are the Answers

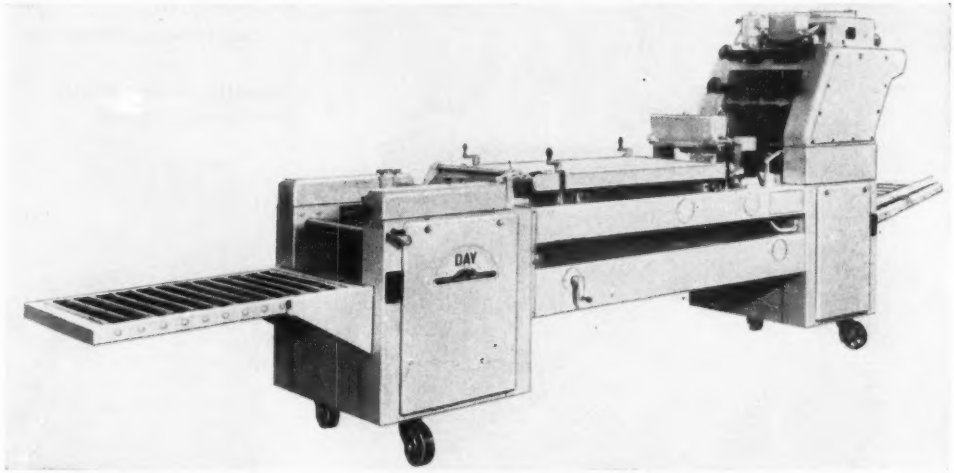
Editor, FOOD ENGINEERING:

With reference to H. L. Bullock's letter commenting on E. D. Andrews' article, "High Voltage Removes Filth", I would like to make the following comments:

Mr. Bullock's U. S. patent No. 2,225,096, issued 12 years ago, briefly describes one of three known methods of producing so-called spark-proof electrodes for any electrostatic separator. Spark-proof electrodes were used for commercial electrostatic installations from 1907 to 1915. Since then, bare metal electrodes have been used.

(*Turn to page 151*)

NEW EQUIPMENT & SUPPLIES



Bread Molding Style Optional on New Unit

Designed for use in the modern high production bakery, this new machine enables baker to mold bread products either cross grain or straight-away.

Combination molder-panner, according to maker, is only one available on which both styles of molding can be done. Machine automatically molds and pans bread loaves at rates between 30 and 100 pieces per min., depending upon loaf size.

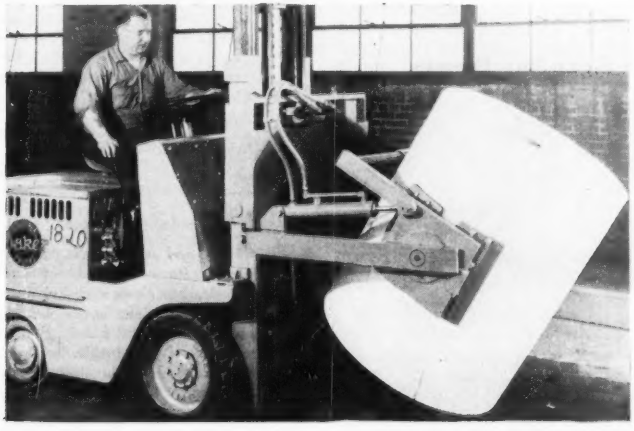
To accomplish cross grain operation, machine is equipped with hook and disk which is motor driven. As dough piece leaves molder, the hook, located slightly off center, interrupts its fall. The rotating disk on which the dough slides then turns the piece 90 deg. from its original position for cross graining. After the dough piece leaves the disk it is curled and elongated in the normal manner.

Unit is convertible in less than 60 sec., without tools, for straight-away or cross grain operation.

Straight-line design creates no new problems in plant layout. Overall dimensions of unit including feed and take off conveyors are: Length 18 ft. 2 in.; width 2 ft. 9 in.; and height 6 ft. 4 in. Net weight is 3,150 lb.—*The J. H. Day Co., Inc., Cincinnati 22.*

Circle 115A on Reader Service Card

Truck Device Simplifies Stacking Cylinders



Cylindrical objects can be picked up and stacked either horizontally or vertically with use of new roll clamp attachment for fork trucks. Device can be detached in two minutes.

The clamp, capable of handling cylinders from 1½ to 3 ft. dia., rotates 90 deg. in a vertical plane. Clamping pressure, controlled by adjustable relief valve in hydraulic system, can be regulated for each type of material handled.

Two men can detach clamp by removing retaining pins at base of truck carriage, detaching two push-pull Hansen couplings on clamp's hydraulic line and lifting clamp off carriage. Next, a set of forks is installed and locked by retaining pins—and truck is ready for pallet loads.—*Baker Industrial Truck Div., Baker-Raulang Co., 1230 W. 80th St., Cleveland 2.*

Circle 115B on Reader Service Card

Flask Agitator Table Has New Type Drive

This new flask agitator is designed for use both in production work and in the laboratory.

Agitator drive is reported to be entirely new development for this type machine. It is self-contained unit eliminating need of rods or other flexible supports for the platform. Drive, maker states, is so designed that rotary movement in a true horizontal plane is assured regardless of whether platform is evenly loaded.

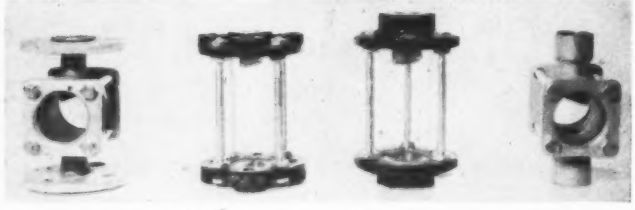
Flasks are held tightly in place on platform. Various types of holders can be furnished, for any size flask or glass jar. Products being agitated are in full view and can be watched through the process. Platforms of up to 10 sq. ft. area are available.

Platform is covered with metal, rubber or composition board and is supported by an aluminum casting. Base is made of cast iron and steel throughout, using anti-friction roller bearings which run in a bath of oil. Unit can be equipped with any fixed speed drive or with variable speed drive.

It is available with or without support table.—*B. F. Gump Co., 1325 South Cicero Ave., Chicago 50.*

Circle 116A on Reader Service Card

Rolled Stainless Steel Used in Sight-Flow Glasses



All metal parts of these new sight-flow glasses which come in contact with liquids are made of heavy-gage rolled, instead of heavy cast stainless steels.

Savings in stainless steel are reported to exceed 60 percent. Strength is not reduced in any way—and this saving in stainless is reflected in price.

New glasses are manufactured in various models, in flanged or screwed types. The loose flange model can be turned to any desired angle for maximum visibility. They are designed for universal use in Schedule 5, 10, and 40 piping systems and are available from stock made of Type 304 and Type 316 stainless steel. Various alloys and coatings are also obtainable.—*Grand Machine & Tool Co., 692-694 E. Grand Ave., Rahway, N. J.*

Circle 116B on Reader Service Card

Speedily Grinds Waste For Sewer Disposal

Use of this improved grinder is reported aiding sanitation control by eliminating food waste in seconds—before it becomes a problem.

New disposer is claimed to grind waste to a fineness ready for acceptance into sewer system. Unit, compact in size, is built for heavy duty operation. It is constructed of wear resistant, non-corrosive aluminum alloy and powered by a 5 hp. motor.

Feeding may be continuous and operation is termed quiet. Unit can be easily installed, using standard plumbing and electrical fittings. Inlet is adaptable for conveyor, funnel or other arrangements needed by user.—*Herlex Mfg. Co. 1442-1450 Van Buren St., Chicago 7.*

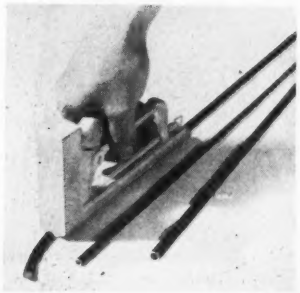
Circle 116C on Reader Service Card

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard just inside the back cover. Then sign at the bottom and mail. No postage is needed.

For your convenience, too, all items in this department are listed and keyed in the Reader Service Section.

Automatic Gun Speeds Cable Installations



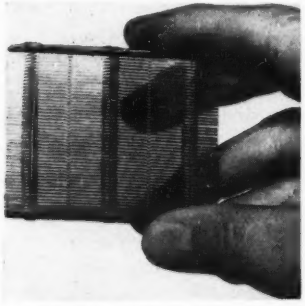
Swift, easy and economical installation of cables and hollow tube lines is provided by a recent hand-held, automatic fastening gun.

Compact machine is operated with one hand, leaving other free to guide lines being installed. It is stated to pack the power of a big industrial stapler. Its force is reported to drive bands around cables and tubes into hard or soft woods, plaster walls, flooring, joists and cinder or mineralite building blocks.

Fastening gun, instead of using ordinary width staples, drives special extra-size band with leg lengths varying from $\frac{5}{8}$ to $\frac{1}{2}$ in.—*The Heller Co., 2153 E. Superior Ave., Cleveland 14.*

Circle 117A on Reader Service Card

Aperture Area Doubled In Dewatering Screen



Designed for processing fine materials, this dewatering screen is claimed to offer double aperture area of conventional units. It's special slots, states maker, does it.

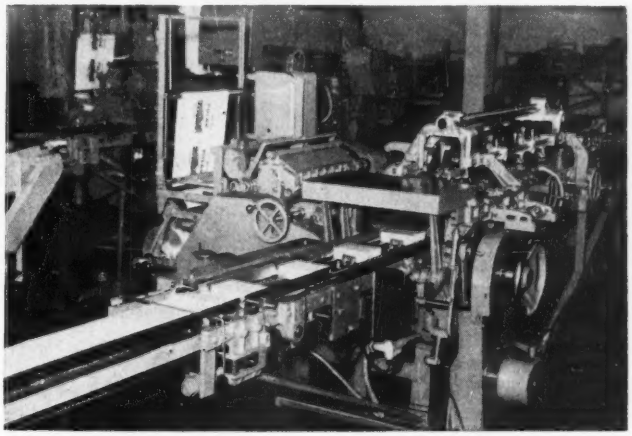
Designated Wedge-Slot screen, it is made with stainless steel bars much smaller than previously used. These have a V-shape profile termed especially effective for dewatering, drying, and filtering. Bars are of two types: Type 10A for openings ranging from 0.004 in. to 0.04 in.; type 15A for openings from 0.012 to 0.06 in.

Slot spacings are uniform even with smallest opening. To prevent distortion of slot width in screening irregularly shaped material, or from vibrating action, spacing between rivets is 1 in. An additional safeguard against mesh distortion during use is provided by special spacing lugs between profile bars which serve to lock the mesh.

Both types can be provided with tension clasps for either side or end tension—interchangeable with any other tensioned screen type—for any make of vibrator. Installations can also be made without clasps for shakers, vibrators, and stationary equipment, by bolting or clamping between rubber strips, or clamping over bucker-up bars.—*Hendrick Mfg. Co., Carbondale, Pa.*

Circle 117B on Reader Service Card

Wraps Frozen Food Packages at 160-Per-Min. Rate



This high-speed frozen food wrapping machine permits maximum production with the latest continuous-motion frozen food filler.

Fillers, which have a speed of 300 packages a minute, have provision for discharge into two wrapping machines. New Model FF-H wrapper has speed of over 160 per min. Thus production of fillers can be handled.

While wrapping machine holds basically to a reciprocal-motion design, smooth uninterrupted operation is claimed despite its high speed. Conjugate cams replace crank arm motion and spring-loaded open cams. Careful attention has been given to working out acceleration factors so that loads are uniform throughout entire cycle of machine. Tests show machine has no peak loads in its operational cycle. Besides permitting smooth operation, lack of shock to bearings and moving parts lengthens machine life.

Problem of obtaining perfect registration at a speed of over 160 packages per minute was reported solved by a radically different method of feeding paper into machine which prevents slippage of intermittently fed wraps. Portions of newly designed paper feed unit are quickly removable for washing and cleaning.

One notable feature of wrapper is "lift-up" overhead transport chain assembly which carries individual packages through folding line of the machine. This unit is counterbalanced so that only a slight effort is required to expose folders. Tests have shown that because of this feature there is a material reduction in shut-down time for clean up when damaged cartons enter the machine.

Model is designed primarily to wrap standard size frozen food cartons. However, it can be adjusted to accommodate any carton from $1\frac{3}{8}$ to $1\frac{7}{8}$ in. high, 5 to $5\frac{7}{8}$ in. long, and 4 to $4\frac{1}{4}$ in. wide. Changeover requires 10 to 15 min. Machine handles any type of wrapping material used for frozen food, especially high-gloss waxed paper and cellophane.—*Package Machinery Co., E. Longfellow P. O., Springfield, Mass.*

Circle 117C on Reader Service Card

NEW *GREASE-RESISTING*
PATAPAR 27-21T *gives*
sure PACKAGE PROTECTION
at low cost

Patapar 27-21T is a new type of Patapar Vegetable Parchment that is light in weight (27-lb) and – in addition to wet-strength – *extremely grease-resistant.* In actual commercial use, Patapar 27-21T has shown greater resistance to grease and oil penetration than conventional grease-resisting papers of much heavier weight. It offers improved packaging at lower cost.

← NO GREASE "crawl"

This test will prove it. Place 5 drops of oil on a sheet of Patapar 27-21T. The drops will not increase in size. They do not spread or "crawl." On a conventional grease-resisting paper the oil drops will crawl and spread noticeably. Patapar 27-21T stops grease "crawl" *completely.*

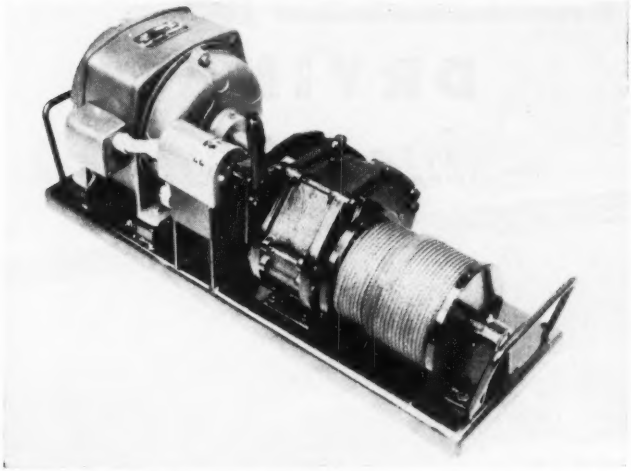
Many important uses

As a wrapper for lard, shortening or margarine Patapar 27-21T gives excellent protection. It stays clean – looks appetizing. And it is economical. Because it resists grease staining, Patapar 27-21T is used also as a package insert for coffee, nuts and other oil bearing products. It is ideal as a protective wrapper for oiled metal parts and leather goods. These are just a few of its many applications.

Send for samples

For samples of Patapar 27-21T and more information, write us today. Tell us the use you may have in mind.

Sturdy Power Winch Is Compact, Portable



This sturdy, portable power winch is engineered for a versatile range of pulling and lifting jobs.

Named the Tugger, it is equipped with either electric or gasoline power units ranging in size from ¾ to 7½ hp. and mounted on fabricated all-steel bases. Two gripper-type carrying handles facilitate moving.

In operation, base is secured by ½ in. lag bolts and provides a stable platform for pulling or lifting. Unit generates line pull ranging from 500 to 1,500 lb. at 55-to-220 fpm. speeds.

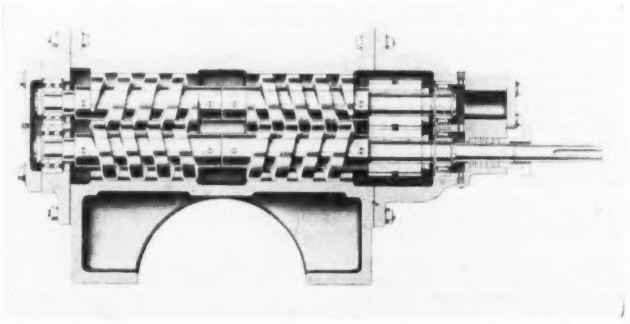
Motor is instantly reversible and is operated by conveniently located lever. A positive, cam acting mechanical brake is automatically applied when motor is shifted to neutral, providing safety of operation. Optional is built-in centrifugal governing brake which controls speed of a free-running or free-falling load.

Gears are completely enclosed and run in continuous oil bath. Motor, drum and pinion shafts are ball bearing mounted.

Base dimensions range from 12 x 32 in. on the smallest model to 12 by 42 in. on largest.—*Dept. KP, St. Anthony Machine Products Co., 2424 E. Franklin Ave., Minneapolis 6, Minn.*

Circle 119A on Reader Service Card

Simplified Maintenance Marks New Screw Pump



Three special features are cited for internal gear and bearing-type screw pump for positive displacement of lubricating or semi-fluids.

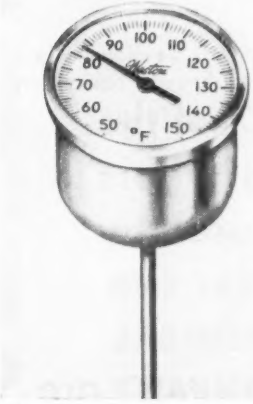
They are as follows: (1) Heavy duty roller bearings just inboard of the timing gears where radial load is heaviest; (2) lock nuts behind the timing gears for faster, simpler repairing; and (3) double-row angular contact ball bearings at rear end which position rotors axially for less wear on bearings and timing gears.

Other advantages are: Interchangeable rotor screws for inexpensive overhauling: no metallic contact between rotors for long life and continued high volumetric efficiency; only suction pressure on stuffing boxes for reduced leakage, longer packing life and easier servicing; direct-connection to 1800 rpm. for use with high speed motors.

Capacities range from 1 to 700 gpm. —*Sier-Bath Gear and Pump Co., Inc., 9252 Hudson Blvd., North Bergen, N. J.*

Circle 119B on Reader Service Card

Floating Thermometer Is Easy to Read



Temperatures can be easily, and accurately read on dial of all-metal floating thermometer without removing it from tank or vat.

Unit, originally designed for use in dairy industry for processing of cheese, is finding application in many fields where it is desirable to have a constant check on liquids during processing.

Thermometer is constructed of stainless steel and is equipped with an unbreakable window. Streamline design makes cleaning easy and eliminates possibility of product contamination. Scale has bold, legible markings to permit quick readings while thermometer floats. Accuracy is plus or minus 1 deg. F. over entire scale.

It is regularly supplied with a range of 50 to 150 deg. F., and stem length of 5 in. although other ranges and special types can be provided.—*Weston Electrical Instrument Corp., 617 Frelinghuysen Ave., Newark, N. J.*

Circle 119C on Reader Service Card

STANDARD-IZED DRYING – *since 1926!*

Latest Standard Dryer, installed at West End Aug. 1952.

Air view of West End Chemical Company buildings. Annual production capacity is 200,000 tons of soda products & borates.

27 of the 28 Dryers used by WEST END CHEMICAL COMPANY are STANDARD-HERSEY

To tap the fabulous sub-strata chemical resources of Searles Lake in California's Mojave desert, it was necessary for the West End Chemical Company in 1926 to bring in special custom-made machinery and set up a plant at the source of the raw product. The machinery had to be rugged and dependable because repairs and replacement facilities were many long desert miles away.

Vital to the West End process of manufacturing borates and soda products is the use of rotary dryers. Their first dryer in 1926 was a STANDARD-HERSEY. With modifications, that dryer is still in use today. Since then, West End has purchased 26 additional STANDARD-HERSEY rotary dryers.

This case history is convincing proof of the dependability of STANDARD-HERSEY Dryers. Now celebrating its 50th year, *Standard Steel Corporation* manufactures more than 30 separate types of dryers for process industries throughout the world. Special equipment can be engineered to fill special drying requirements.

Standard-Hersey "pilot" drying facilities, utilizing our test plants, are available to both customers and prospective customers. WRITE TODAY FOR COMPLETE DRYER BULLETIN NO. 524.

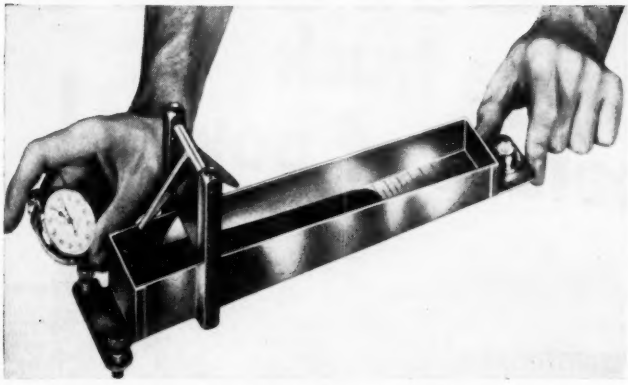
STANDARD HERSEY *Dryers*

STANDARD STEEL CORPORATION

5045 Boyle Ave., Los Angeles 58 ★ 419-45 Commonwealth Ave., Boston 15

STANDARD 1902 50 YEARS 1952 STEEL CORPORATION

Measures Consistency of Viscous Materials



With use of this new instrument, the consistency of viscous materials, such as tomato products, jams, and preserves can be measured. Principle of operation is a measurement of distance over which material flows on a level surface under its own weight during a given time interval.

Known as Conco-Bostwick Consistometer, it is being used currently by preservers in predetermining formulas for making jams and preserves of a desired consistency. Small sample batches of products can be tested with the unit and formula changes made in accordance with readings. In this way production lots can be standardized.

Device is constructed of a graduated, rectangular, Monel metal trough divided about 2 in. from one end into two sections by a vertical-action gate. The gate is spring operated and held down by an L-shaped trigger which releases it instantaneously. The larger section of the trough is graduated on the bottom in divisions of 0.5 cm.

In use the small compartment is filled with substance to be measured. When gate is released sample flows into graduated section and distance it travels over a period of one minute is noted. As moving edge of flow of viscous materials is not uniform, both maximum and minimum distances are measured and an average taken of the two extremes. This average may be used as mean consistency of product.

Tests on jams and preserves have shown that a flow of between 8 and 10 cm. indicates a desirable consistency. A thick jam of preserve flows about 4 or 5 cm. a thin product between 14 and 15 cm. To assure proper results, material is maintained at a temperature of 20 deg. C before testing.

Instrument is provided with two leveling screws at one end with which trough may be kept level as indicated by spirit level at other end. Dimensions are: Length, 12 in.; depth, 1 in.; and width, 2½ in. Accessories are a stop watch, spatula and thermometer. —*Central Scientific Co., 1700 Irving Park Road, Chicago 13, Ill.*

Circle 121A on Reader Service Card

Braided Plastic Tubing Takes Pressure Liquids

Developed for use in handling liquids under pressure is new Tygon plastic tubing with triple-wire, stainless steel outer braid. Further, tubing is claimed chemically resistant, translucent, non-toxic and flexible.

With braided reinforcement, tubing is stated to absorb vibration more readily and not to crack, leak, or break under working pressures up to and including 300 psi.

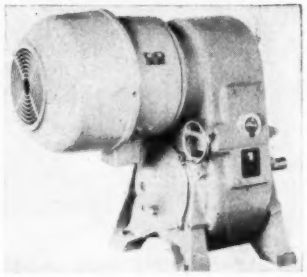
Flexibility of tubing cuts both footage and number of fittings required. No special tools are required for installation. Tubing, being translucent, permits visual inspection of flow and simplifies cleaning.

Braided tubing, stocked in two sizes —¼ and ⅜ in. ID.—is available in six standard formulations and in running or fitted lengths. All fittings are stainless steel. Smaller fittings can be field applied. The ⅜ in. ID. crimped fittings are factory applied. Other sizes of tubing and fittings are available on special order.

Tubing is termed particularly useful in food and beverage fields for pressure lines in carbonator and refrigeration units or in handling of syrups and beverages. It can be safely used for pressure transmission of virtually any liquid, gas, or semi-solid at temperatures up to 200 deg. F.—*U. S. Stoneware Co., 60 E. 42nd St., Akron 9, Ohio.*

Circle 121B on Reader Service Card

Totally Enclosed Drives For Variable Speeds



Speed-Trols, electric power drives, in the range of 20 to 25 h.p. with 2-1, 3-1, 4-1 speed variations, are now available in totally enclosed fan-cooled models.

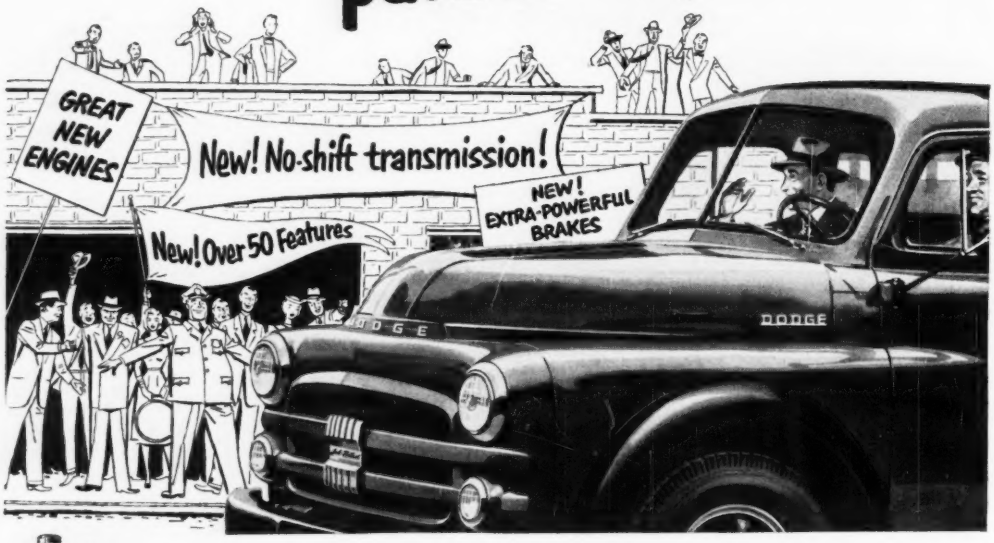
Dual fan system is stated providing highly efficient internal and external cooling. Air inside motor is continuously circulated by large diameter internal fan through unobstructed passages between and over windings, and through openings in rotor. Circulating air is kept in continuous contact with motor housing. Cooling is thus accomplished because heat from every part of motor is quickly transferred by triple action of convection, conduction and radiation to outside of motor.

There, remaining heat is rapidly carried off by continuous flow of cooling air forced over motor housing by external fan and removable grilled-fan cover.—*Sterling Electric Motors, Inc., 5401 Anaheim-Telegraph Rd., Los Angeles 22.*

Circle 121C on Reader Service Card

ANNOUNCING

A new Dodge truck parade of power!



NEW! More powerful engines!

A parade of power! See the new Dodge "*Job-Rated*" trucks at your Dodge dealer's today. A total of 7 big, rarin'-to-go engines, including 3 brand-new power plants with high compression ratios and higher horsepower, greater cooling capacity, increased displacement, twin carburetion available on larger models. Plus famous features like 4-ring pistons with chrome-plated top ring, exhaust valve seat inserts.

In addition, the new Dodge trucks offer outstanding new brakes, new no-shift transmission, and over 50 other new features. See your Dodge dealer for the biggest truck buy on record!

For a truck, ½-ton through 4-ton that fits the job, see the NEW...

NEW! Extra-powerful brakes!

Stop easily on steep grades, fully loaded. Super-safe brakes give silky-smooth braking, reduced driver fatigue, greater load protection . . . new increased stopping ability on 1- through 2½-ton trucks! *PLUS* Dodge's oversize braking surface with Cyclebond linings.

NEW! Truck-o-matic transmission!

New Truck-o-matic transmission . . . available on ½- and ¾-ton models of Dodge "*Job-Rated*" trucks . . . saves shifting, cuts driver fatigue, lets you rock out of snow, mud, sand. Only Dodge offers shift-free Truck-o-matic! *PLUS* famous gyrol Fluid Drive, to lengthen truck life, protect your load.

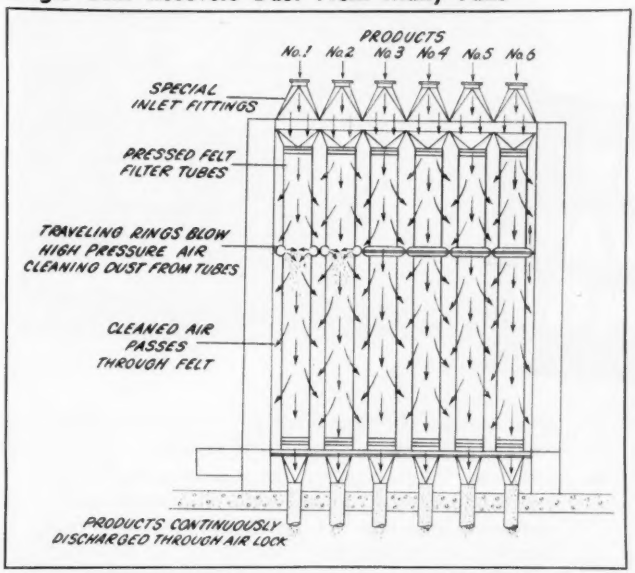
NEW! Over 50 features!

50 ways new! Reinforced cab construction, improved exhaust system, extra-capacity radiators. Tinted glass, heaters with stepped-up heat output available. *PLUS* moistureproof ignition, high-torque capacity starting motors, and other dependability features. See your Dodge dealer.

DODGE "Job-Rated" TRUCKS

Now on display at Your Dodge Dealer's!

Single Unit Recovers Dust From Many Fans


PRODUCTS
No.1 No.2 No.3 No.4 No.5 No.6
SPECIAL INLET FITTINGS
PRESSED FELT FILTER TUBES
TRAVELING RINGS BLOW HIGH PRESSURE AIR CLEANING DUST FROM TUBES
CLEANED AIR PASSES THROUGH FELT
PRODUCTS CONTINUOUSLY DISCHARGED THROUGH AIR LOCK

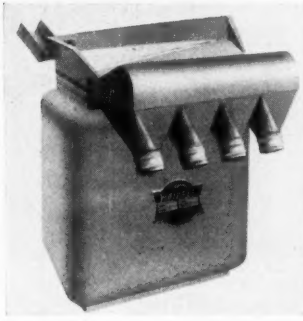
Filtering and recovery of dust from two or more exhaust fans without mixing of products is achieved by this single unit equipped with plenum splitters. Dust-laden air from each exhaust fan is filtered separately to allow reclamation of individual products.

Licensed under Hersey patents, the unit uses highly efficient felt tubes as the filtering medium. Filter cleaning is continuous and automatic. Slow-traveling reverse air jet rings dislodge collected dust from filtering area and discharge it to air stream leading to bottom of unit.

Continuous-automatic operation eliminates periodic shutdowns of sections for cleaning. Thus, it is possible to maintain uniform back pressures and constant air volume. Filter also permits use of higher air-pressures to handle greater volumes of air per unit.—*The Day Co., 820 Third Ave., N. E., Minneapolis, Minn.*

Circle 123A on Reader Service Card

New Gravity Separator Has Greater Capacity



Outstanding design feature claimed for this new gravity separator is a "delta" shaped deck and body which —with its counter-balanced eccentric mechanism—assures long-wear stability. Further, the design also increases culling capacity on lightweight products.

Model separator, Whippet V-80, represents distinct departure from overall size and general shape of preceding units, although basic air-flotation operating principle has been retained.

Designed originally for small lot work in connection with research and testing phases of processing operations, the unit is also being used in conjunction with heavier equipment to provide continuous de-stoning and re-treating of light end or middling products.

Compact, lightweight machine does not require lagging to the floor and, weighing less than 100 lb., can be lifted and moved about easily. It measures only 22 x 25½ in. and thus requires minimum plant space.

Unit has a self-contained air intake and distribution system, and centralized fingertip controls for convenience in making operating adjustments. Requiring less power to operate than regular units, model is believed to have many practical applications heretofore considered prohibitive due to cost, weight, and space factors.—*Sutton, Steele & Steele, Inc., 1031 S. Haskell, Dallas, Texas.*

Circle 123B on Reader Service Card

Motorized Plant Sweeper Cuts Cleaning Time

With use of this improved, motorized plant sweeper, industrial cleaning is reported accomplished in a fraction of time required by old-fashioned push broom method.

Machine, comprised of rotary brush sweeper and heavy-duty vacuum cleaner combined into an integral unit, is said to be highly efficient on dust, dirt, scrap paper and cardboard, grass, leaves, and other debris.

Manufacturer claims that with its use plant maintenance time and costs can be cut up to 75 percent. One instance is cited where one man and sweeper in a large paper products firm, swept 12 mi. of 8-ft. warehouse aisles in 6 hr. This job formerly required three men with brooms working 8 hr.

Sweeping is done by eight sturdy 36-in. hardwood, Palmyra filled brushes welded into a single circular unit of 17-in. dia and 36-in. long. Effective sweeping area is increased to 48-in. by use of side brush attachment.

Vacuum is built-in, and is mounted directly on engine shaft. A 1½ hp. Briggs and Stratton air-cooled engine delivers power to pull operator on riding sulky, as well as operate sweeper at a speed up to 4 mph.—*Multi-Clean Products, Inc., 2277 Ford Parkway, St. Paul 1.*

Circle 123C on Reader Service Card

International Salt Company's Industrial Engineers Will Show You How to

PROFIT BY THESE 4-WAY SALT SAVINGS

1. SAVINGS ON STORAGE by engineering the most efficient and compact salt storage system to fit your situation.

2. SAVINGS IN LABOR by reducing effort and supervision involved in salt or brine handling.

3. SAVINGS ON WASTE through accurate salt measurement and elimination of spillage and spoilage.

4. SAVINGS IN USE. Research and field work with hundreds of industries in many fields equip International to show you how best to utilize salt in your product processing—and for product improvement, too.

If your company uses salt, it will pay you to call on International Salt Company's Industrial Division.

Without obligation to you, this experienced staff of experts is at your service to inform you on latest salt developments in your field and to help on all phases of salt handling and storage, brine making, and salt and brine uses. They can help you save money four ways—and, on the record, the savings can be substantial.

A Complete Service

International Salt Company's Industrial Division is maintained as a service to industry by one of America's foremost salt producers.

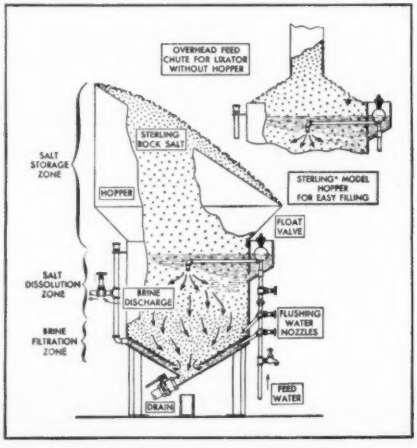
This company produces all types of salt and operates from strategically located mines and refineries. The scope of its operation necessitates familiarity with latest salt developments in every field, many of which have been pioneered by International Salt Company.

LIXATOR*—A NOTABLE EXAMPLE

The Lixator is one of International's outstanding advances in salt technology. Utilizing Sterling Rock Salt, the Lixate principle of self-filtration, invented and developed exclusively by the International Salt Company, provides a steady flow of pure, clean, fully saturated brine.

No handling or attention is required beyond the hopper-loading stage—gravity does all the work. The Lixate Process is adaptable to almost numberless industrial requirements, large or small.

*Reg. U. S. Pat. Off.

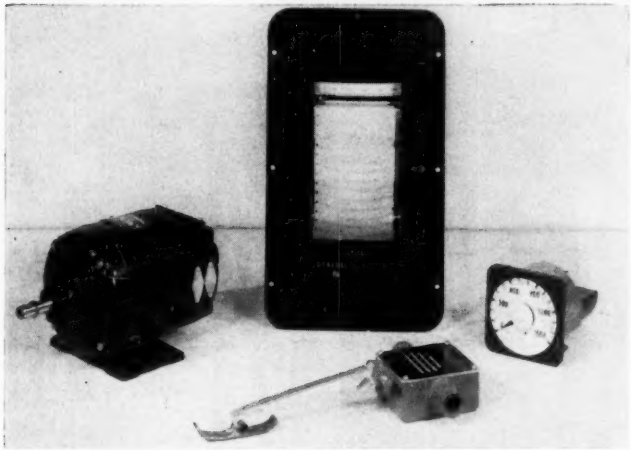


INTERNATIONAL SALT COMPANY, INC.

Scranton 2, Pa.

SALES OFFICES: Atlanta, Ga. • New Orleans, La.
Boston, Mass. • St. Louis, Mo. • Newark, N. J.
Buffalo, N. Y. • New York, N. Y. • Cincinnati, O.
Philadelphia, Pa. • Pittsburgh, Pa. • Richmond, Va.

Units Provide Machine-Performance Records



All the components necessary to provide instantaneous and permanent records of machine performance at a central location, are contained in new tachometer kits just announced.

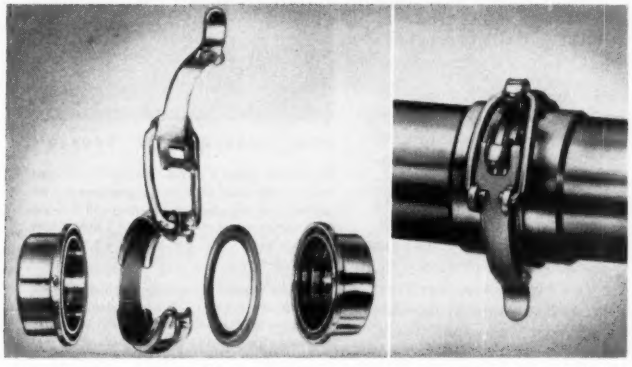
Central location of recording equipment eliminates time-consuming production-line trips by supervisory personnel, permitting up-to-the-minute checks of operating equipment. Permanent recording feature aids preventive maintenance scheduling, and avoids manufacturing losses by automatically shutting down units in breakdowns.

Four kits are available in the new line. A typical installation would include a dc. tachometer generator (at left in photo), an indicator (right), a switchboard-type recorder (center), and—where a continuous web of material is produced — a web-break detector (foreground). Audible or visual alarm systems are optional accessories.

Kits are particularly suited for use in continuous process industries.—*General Electric Co., Schenectady 5.*

Circle 125A on Reader Service Card

Threadless Sanitary Fittings Go On Fast and Easy



Speed and ease of installation mark this newly designed, threadless sanitary fitting.

Known as Tri-Clamp, its spring clamp action presents a new concept of sanitary fitting design and fabrication—offering savings in original cost and trouble-free life.

New series is available in full line of standard sanitary-type fittings and valves, for both "permanent" and "take-down" installations in 1½, 2, 2½, 3, and 4 in. sizes fabricated of Type 304 stainless steel.

Joint consists of flange type ferrule, a special precision molded Hycar gasket which fits into the grooved ferrule lip, and the clamp proper. Clamp is comprised of special fabricated spring which grips ferrule edges, and a simple, snap action toggle.

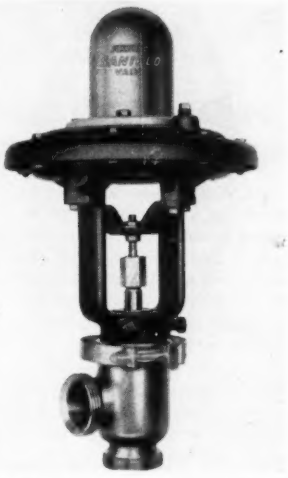
In actual use, new fittings, when permanently installed in "cleaned-in-place" piping have been reported to effect savings up to 60 percent in labor costs alone.

For "take-down-lines" the snap action clamp permits instant assembly and disassembly. New unions open easily—no hammering necessary—thus no loosening of ferrules or battering. They can be used in conjunction with standard fittings through use of adaptors.

Tests, in both field and laboratory, show fittings to be fully sanitary and leak-free. Joints are flush, with smooth, non-toxic gaskets held under even pressure.—*Tri-Clover Machine Co., Kenosha, Wis.*

Circle 125B on Reader Service Card

Sanitary Control Valve Is Readily Cleaned



Quick and easy disassembly for cleaning mark this new 2-way, sanitary control valve designed specifically for use with such processing equipment as juice heaters, pasteurizers, milk lines, deaerators and fillers.

Called Saniflo, all parts of unit exposed to product are Type 18-8, corrosion-resistant stainless steel. One piece stem and plunger eliminates threads and crevices which would harbor bacteria formations. To clean, operator simply snaps quick-disconnect

Circulating conditioned air evenly throughout the smokehouse is a problem.

HOW TO "SMOKE OUT"

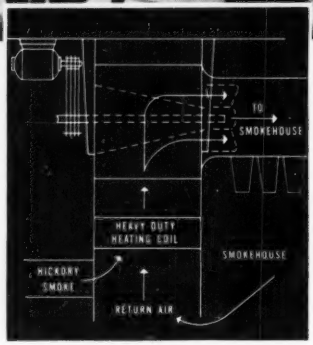
HIGH OPERATING COSTS IN A SMOKEHOUSE

The circulation of conditioned air, so necessary for smoking meats, has always been a problem. Tars accumulating on the fans and heating coils cut capacity, thus slowing down production. The necessary maintenance further increases operating costs, but not any more.

Armour and Company knew they needed a fan that would keep belts and bearings outside of the air stream. The housing had to be so shaped that it would not collect tars. The steam heating coil had to be sturdy, easily cleanable, and efficient.

Engineers of Armour and Westinghouse teamed up—decided on Westinghouse Elbow Axiflo® Fans and Heavy Duty Steam Coils built entirely of steel. This was the answer to this involved problem. The fans and coils fill the bill so well that they have now been put into service at 16 Armour smokehouses.

Some day you may have a problem that involves *putting air to work*. When you do, remember that Westinghouse has the most complete line of air handling, air cleaning and air conditioning in the industry. Ask for new Catalog 600. It contains 60 fact-filled pages on these products, and how they can put air to work for you. For your free copy, call your local Westinghouse-Sturtevant office. Or, write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.



HOW A SMOKEHOUSE IS "SMOKED"

Hardwood smoke is drawn into the system and mixed with return air from the smokehouse. This mixture next passes over a heating coil to bring it to the proper temperature. An Elbow Axiflo Fan then turns it 90° into ducts which feed the discharge nozzles.

Note how fan motor, bearings and belts lie outside the air stream. This keeps them free of hazardous tar and heat, and makes them easy to maintain. The fan and coils are accessible, and all-steel construction withstands alkali cleaners.

YOU CAN BE SURE...IF IT'S

Westinghouse

AIR HANDLING

J-80284

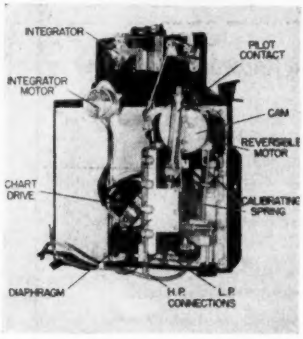
clamp, removing body and loosens a hand nut to free plunger-stem. There are no gaskets or stuffing boxes to complicate cleaning; Neoprene O-ring seals are used between body and bonnet, bonnet and valve stem.

Streamlined body construction is stated to allow greater flow of product, even in viscous service such as processed cheese, chocolate liquor and cream style corn. Plunger is modified parabolic design, equally effective in throttling (proportional) and open-and-shut control. Single seat and self-aligning construction provide tight shutoff in closed position.

Other features include reversible diaphragm motor (air-to-open and air-to-close); linear flow characteristics for proportional control; and friction-free motor action (no guides or bearings). Valve connections are 3A (IAMD thread), male, ground-seat type. Standard line sizes, 1 through 3 in., are available.—*The Foxboro Co., Foxboro, Mass.*

Circle 125C on Reader Service Card

Differential Flow Meter Records Air-Gas Ratio



This newly designed low differential flow meter measures air flow, gas flow, or records ratio of one to the other. Especially adaptable for industrial furnaces and sewage disposal plants, the meter is used as a guide in achieving product, process, and cost control.

Called Diaflow meter, it utilizes the pilot method of operation in which no load is placed on the measuring element—thus possessing high accuracy with negligible friction. Since it uses a dry diaphragm type measuring element, no water, oil or mercury are required and leveling is eliminated. Unit construction, whereby parts can be removed separately or as a whole without affecting calibration, has been used throughout.

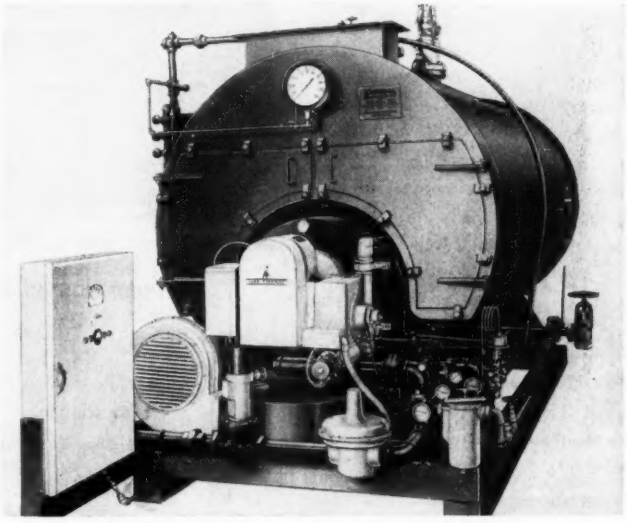
By means of a pivoted, swinging frame, internal parts are accessible from front of case for easy removal without special tools. Unit, in addition to measuring a single flow, can be provided with two flow elements so that gas and air flow records can be combined and coordinated for efficient combustion.

Measuring element is differential type diaphragm unit which will accommodate static pressure up to 10 lb. and differential pressures up to 20 in. water. Single heavy-duty fine-silver wiping contact converts diaphragm differential into electrical impulse which energizes reversing motor to provide the necessary power required for the meter.

Capacitor type motor which is specially built for this "reversing duty" has a squirrel cage rotor and a fully enclosed lubricated gear train. Normal variations in voltage and frequency have no noticeable affect on its operation. To provide ease of reading flow, a cam is incorporated to change the square-root relationship between differential pressure, and flow to an easily read equal-increment flow record.—*The Hays Corp., Michigan City, Indiana.*

Circle 127A on Reader Service Card

Separate-Make Boiler and Burner Combined



Two well known manufacturers of heating and power equipment have jointly announced a line of boiler-burner combination units. Each unit is comprised of a packaged burner complete with all controls, made by one firm, and a boiler completely assembled with its accessory equipment for oil, or oil and gas, or gas firing, made by the second firm.

Two components are integrated into combination units available for high pressure steam and water in sizes ranging from 52 to 304 hp., 125 and 150 lb. working pressure; also for low pressure 15 lb. steam or 30 lb. water, in sizes from 1,808,000 to 8,400,000 Btu. They may be fired with No. 6 or lighter fuel oils, gas (either high pressure or as low as 2 oz.), or a combination of both fuels.

Boiler portion of unit is completely assembled with all essential elements, tested, mounted on substantial steel skids and shipped direct from maker to job site. Boilers are constructed in accordance with A.S.M.E. code and are rated in accordance with the Steel Boiler Institute's rating code.

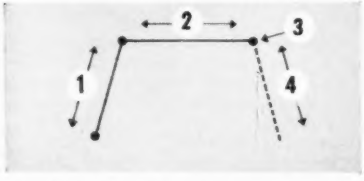
Burner portion, including all controls and forced draft air supply, is completely assembled, wired and factory tested. Matching connections are provided, so that when this packaged assembly, as shipped from plant arrives on the job, it can be connected to boiler in a very short time. All refractories are integrally mounted at factory, thus reducing to minimum amount of field work required in placing this combination unit into service.

Units are designed for forced draft

If You're Batch-Cooking You Can Use This Inexpensive Control

Here is a recorder-controller planned especially for economically controlling processes like batch cooking. The Gotham Elapsed Time Recorder-Controller does the essential control jobs easily and accurately. First of all, it brings the batch up to maximum holding temperature fast. It holds the batch at that temperature for a predetermined period. It shuts down the process at the end of the cooking period. Those are its three standard functions. Automatic venting or cooling functions can be added. Also available with a pressure, instead of temperature, system.

Write for full information about the Elapsed Time Recorder-Controller and other Gotham Controllers. They're in Catalog 500.



This Is What the Gotham Elapsed Time Recorder-Controller Does

1. Brings controlled variable (temperature or pressure) up to maximum fast.
2. Holds variable at maximum for predetermined period.
3. Shuts down process.
4. Automatic venting or cooling can be added.

Gotham Elapsed Time Recorder-Controller

SPECIFICATIONS

CHART SIZE: 12"

CASE: Standard - black crinkle; smooth black or white may be obtained.

ACTUATION: Vapor, Gas or Mercury for temperature. Pressure elements available.

CHART DRIVE: Spring wound or synchronous motor.

CONTROL SYSTEM: Pilot relay with adjustable sensitivity for 0 to 30% throttling band is standard, two position or 100% throttling band available.

HOLDING PERIOD: Standard 0 to 3 hrs. Other periods available.

Keep Everything Under Control With Gotham

GOTHAM INSTRUMENTS

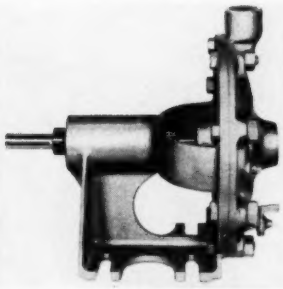
Division of AMERICAN MACHINE AND METALS, INC.

Dept. 9, 233 Broadway, New York 12, New York

operation, eliminating necessity of a high stack. Provision need only be made for a small vent extending above the roof.—Combined units were developed and are offered by *Iron Fireman Mfg. Co., Cleveland, (burner) and Kewanee-Ross Corp., Kewanee, Ill., (boiler).*

Circle 127B on Reader Service Card

Centrifugal Pump Runs In Either Direction



This new centrifugal pump is reported to operate with equal efficiency when rotated in either direction.

Known as Model CAY, new pump was designed primarily for circulating cooling water in air compressors, diesel and gasoline engines, and other water-cooled machines.

Advantages of reversible unit are said to include easy installation in any position on a machine, simplified piping design, and adaptability to any type of drive. New unit, manufacturer states, has successfully been installed on either side of the same machine without turning the pump around when moving it from one side to other.

Pump is suitable for heads up to 50 ft. and capacities up to 67 gpm. It is fitted with two pre-lubricated ball bearings, and has a mechanical seal that is said to eliminate stuffing box leakage—*Gardner-Denver Co., Quincy, Ill.*

Circle 129A on Reader Service Card

Seed Oil "Package Plant" Eliminates Prepressing

Range of "package plants" for direct extraction of oil from cottonseed and other seeds of high oil content by filtration-extraction process is being made available to mills of 75 tons and up.

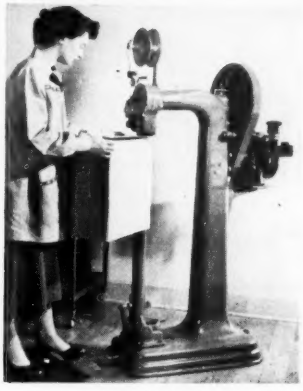
Designed to permit smaller cottonseed crusher to economically convert to solvent extraction without prepressing, the process was developed after 18 months of research. It is based on successful experiments of the Southern Regional Research Laboratory, U. S. Dept. of Agriculture. Standard plant capacities of 75, 100, 125 and 150 tons will be offered, with special systems available to meet individual requirements.

New process is expected to achieve following performances in commercial operation: Oil yield of better than 98 percent with residual oil in meal of less than 1 percent; high meal purity with gossypol content of .03 percent maximum and thorough solvent removal; top grade oil quality for type and condition of seed processed; and solvent recovery over 99 percent.

According to manufacturer, besides eliminating the prepressing operation, process can be used with presently installed de-linting, de-hulling, cleaning, storage, crushing roll, and cooking equipment. Operation of the "package plant" is continuous and automatic, requiring a minimum of labor and technical supervision.—*Lukens Steel Co., Coatesville, Pa.*

Circle 129B on Reader Service Card

Wire Stitcher Powered By Gasoline Engine



Economical wire-stitching operations in the field are now possible with a new mobile, carton-stitching machine powered by a gasoline engine.

Where electricity cannot be supplied conveniently, this stitcher may be supplied with 1 hp. Briggs & Stratton 4-cycle gasoline engine.

Burning "regular" gasoline, without oil mixture, machine extends economical carton-stitching operations to warehouse, dock, yard, and loading platform.

Unit can be mounted on trucks, pushcarts, dollies or any type of power truck equipment. Unit has been found especially useful for field packaging of fruits and vegetables.

Engine is started with a pull-rope. Stopping is accomplished with a simple grounding mechanism. Idler control permits varying stitching speeds from 150 to 345 stitches per min. and eliminates need for a variable speed pulley. Fuel cost for engine is reported to average 10 cents per day.—*Acme Steel Co., 2840 Archer Ave., Chicago 8.*

Circle 129C on Reader Service Card

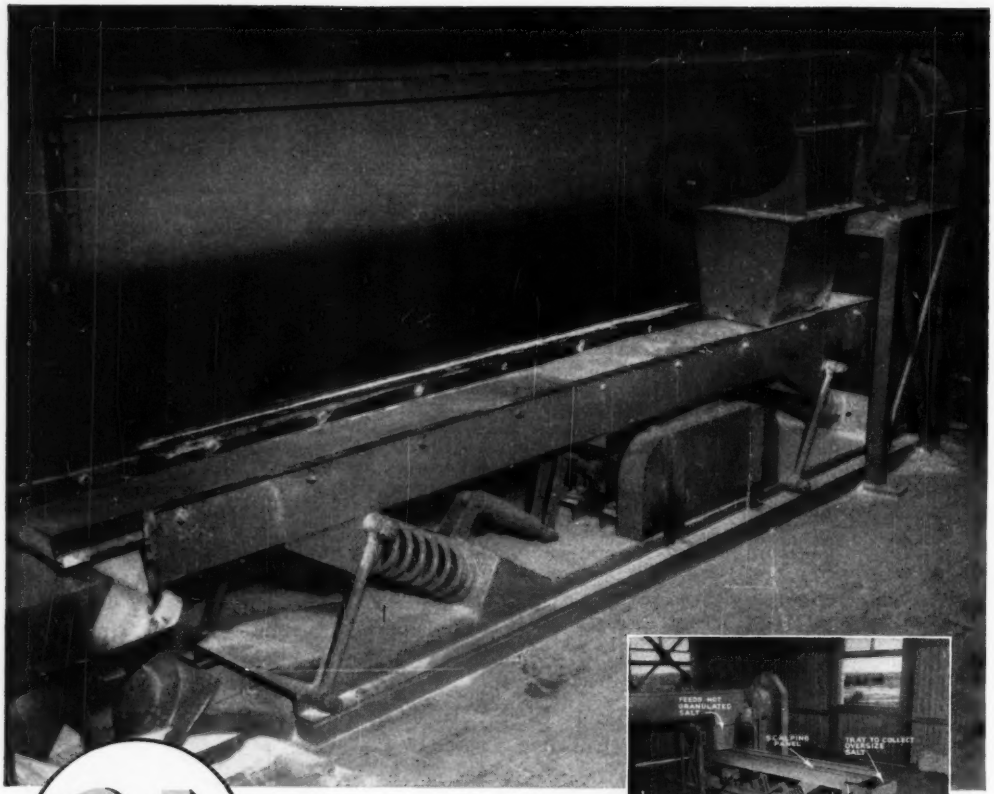
Electronic Type Scales For Trucks, Rail Cars

Savings through reduced pit requirements are among advantages claimed for new electronic type scales employed in weighing motor trucks and railroad cars.

Truck platforms are supported by four or six electronic weighing cells depending upon capacity. These cells are but 6 in. high, are hermetically sealed, and contain permanent resistance wire strain gage units which transmit weight impulse to the indicator. No other equipment is required in the scale pit. Track scales normally require eight such weighing cells of a larger individual capacity.

Truck scale capacities range from 10 to 50 tons. Track units go as high as 400 tons. All standard platform and weighbridge sizes are available in each category. Further advantage claimed lies in the practicality of relocating the scale should original location ever become obsolete. For check weighing and modernization, electronic equipment may be installed in most existing track lever-type scales.

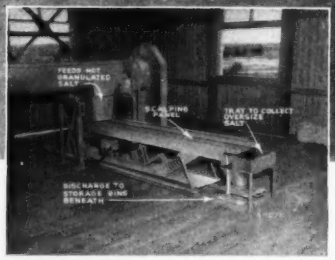
Both visual and printed weights are offered in the MP-1 model. Standard

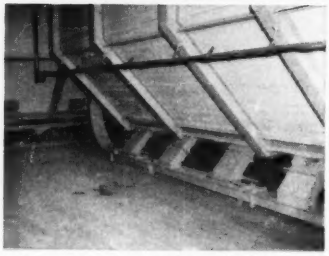


S-A CONVEYING Systems

"PLEASE, PASS THE SALT!"

When this large salt producer wanted salt moved rapidly and economically——some of it at 300° F.——plant engineers came to S-A and got what they wanted. Salt flakes and granules are now conveyed and scalped at capacities ranging up to 25 tons per hour! S-A engineers can bring your material handling problem to a similar speedy solution. A few lines on your letterhead will get you full particulars with no obligation.





Above—Short "Natural Frequency" vibrating conveyors receive salt from screw conveyor. Note screen deck which removes oversize particles. Coil spring regenerates power. Middle—Another "Natural Frequency" unit conveying and scalping. Bottom—Vertical runaround Redler with open U-shaped flights picks up salt from multiple openings in bin at a rate of 25 tons per hour.

STEPHEN S-A DAMSON MFG. CO.

6 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif., Belleville, Ontario

Belt Conveyors	Vibrating Screens
Vibrating Conveyors	Bin Gates, All Types
REDLER Conveyor-Elevators	Box Car Loaders & Unloaders
ZIPPER Conveyor-Elevators	Circular Bin Dischargers
Screw Conveyors	Centrifugal Loaders & Pilers
Bucket Elevators	TELLEVEL Bin Level Controls
Pan Conveyors	SEALMASTER Ball Bearing Units

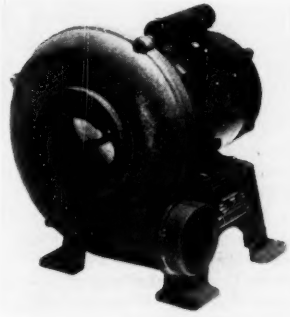
Write for bulletins on any of the above

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

tolerances are guaranteed and weights in the 100,000 lb. range may be printed and read in 5 lb. increments. On 200 ton track scale equipment weights may be printed to the nearest 50 lb.—*Cox and Stevens Aircraft Corp., Mineola, N. Y.*

Circle 129D on Reader Service Card

Lightweight Blower Made of Aluminum



Fumes, smoke, dust, and obnoxious odors are quickly removed by this high-pressure, lightweight blower.

All-aluminum, blower moves up to 450 cfm. On standard unit, made with a 5-½ in. inlet and 3-½ in. outlet, power is supplied by enclosed, ½-hp. 115v, single-phase ac, 3,450 rpm. motor.—*Standard Electric Mfg. Co., Inc., West Berlin 12, N. J.*

Circle 131A on Reader Service Card

Easy Servicing, Safety Mark New Lift Trucks

Operator comfort, ease of servicing and safety are features claimed for two new fork-lift truck models, of 8,000- and 6,000-lb. capacities, respectively. Both are gasoline-engine powered and mounted on pneumatic tires.

Other features reported for unit illustrated, the "ZA-80" (8,000 lb.), are shorter overall length, long wheelbase and better weight distribution.

The "XA-60" model (6,000 lb.) incorporates all heavy-duty features of the larger truck, but with shorter wheelbase, width and overall length. Stated to be smallest and heaviest 6,000-lb. truck ever designed, it is termed compact and highly maneuverable.—*Hyster Co., Portland, Ore., Peoria and Danville, Ill.*

Circle 131B on Reader Service Card

New Chemicals

Synthetic Resin Coating Is Corrosion Resistant

Announced is a new corrosion-resistant synthetic coating for use in the presence of food acids, chemical fumes, moisture and high humidity. It can be employed on wood, masonry or metal surfaces.

Known as Pozcote, it contains inert synthetic resins and is reported impervious to water, acids, alkalis, alcohol, syrups, oils and grease. Company states material is tough, long wearing and serves well as floor coating under heavy truck and food traffic. It can be used indoors and out. Because of elasticity, coating is claimed not to peel from temperature changes. It is available in black, aluminum, clear, white, and a complete assortment of colors.—*The Monroe Co., Inc., 10703 Quebec Ave., Cleveland 6.*

Circle 131C on Reader Service Card

Duo-Purpose Adhesive Used on Felt Tape

Announced is a new felt pressure-sensitive tape (felt tape with adhesive on one side), with a duo-purpose adhesive which also provides for permanent attachment, when desired.

As it comes from roll, it is reported to adhere under light finger-pressure to all surfaces—metal, glass, wood, ceramics. And, for permanent bond, adhesive is merely moistened with a liquid reactivating agent.

Tape is used to seal against dust, air, fumes, moisture; eliminate squeaks and rattles; cushion glass, and dampen vibration. It cuts cleanly and easily into shapes and gaskets. Maker claims tape always stays soft and pliable. It is made in impregnated-felt and unimpregnated types.—*Spring Packing Corp. 332 S. Michigan Ave., Chicago.*

Circle 131D on Reader Service Card

Flexible Metal Zippers Add to Glove Grip

Positive gripping action, long wearing qualities and maximum pliability are claimed for these new work gloves.

Called Armor Grip, they are made with closed, flexible metal zippers permanently bonded to fingers and palms in synthetic rubber. Gloves are manufactured in all sizes and styles for jobs requiring maximum protection for palms and fingers. — *Surety Rubber Co., Carrollton, Ohio.*

Circle 131E on Reader Service Card

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In Behalf of Progress . . .

Don't Wait for Washington to Solve Your Problems

Food manufacturers will benefit by what happened on November 4, because the change assures a better "climate" for business operations.

Taxes may be lowered eventually through a noticeable cut in the federal budget. Price controls probably will be replaced by monetary methods of stopping inflation. Labor is not likely to have government support for its monopolistic maneuvers. Prices for raw material may not be jacked up so much by all-out farm-benefit plans and dumping of price-depressing surpluses abroad at taxpayers' expense.

Businesses which have prospered and grown through sound and successful methods should not so often be the targets of Department of Justice witch-hunts. (However, the Vice-President elect did say that there are monopolies which harm the small business man.)

But when one takes a realistic look, he will see that the domestic policies established in the past 20 years will not be scrapped—merely managed more intelligently and conservatively. Labor will continue to make gains. Farm prices will be supported. Our allies will get help. Military expenditures will be high. And the operation of the federal government will be expensive.

In short, the high price of labor, materials, and taxes will still be with us in the years ahead, though the latter should be eased noticeably.

As a matter of fact, business men would be the last to want key props pulled from under our economy. The business outlook is good. Economists agree that the high level will carry at least through the first six months of 1953, with nothing more than a corrective adjustment in the latter half of the year. Who wants to spoil that picture?

Of course, some shifting of economic props is desirable. We refer particularly to President-Elect Eisenhower's idea of taking the boom ball from government and letting business carry it. This he would do by stopping inflationary monetary practices, then cutting corporation taxes to give business more purchasing power. With improved keep-home profits, business firms then would bolster prosperity by greater expenditure for modernization and expansion, and for research to develop new products and new methods.

Situation Presents Challenge

The changes foreseen in federal policies are wonderful. In fact, they will save the rights of the individual and the freedom of enterprise that were so much endangered before November 4.

But in a practical sense, basic business problems will not be solved by the new administration. Therefore, food manufacturers will make the mistake of their business lives if they sit back and wait for salvation.

To the contrary, business now faces a challenge to show what free enterprise can really do to keep the economy prosperous. The period between now and 1956 may be the last chance. Remember that the election landslide was for Eisenhower, not for the Republican party. The 83rd Congress is almost evenly divided between the two parties.

Now the great problem ahead of the food industry is that of reversing the trend to slimmer net profits. Amounting to only 2.5¢ of the sales dollar last year, the profit margin shrunk still farther to an estimated 2.2¢ for the first half of 1952. While some improvement was noted in the third quarter, net profits for the year as a whole still look about 10 percent smaller than for last year.

In our highly competitive industry, there is only one way to ease the profit squeeze. Food manufacturers must engineer themselves out of it.

And that is just what progressive companies propose to do. A preliminary survey indicates that the food industry will boost expenditures for new plant and equipment 7 percent above the estimated $933 million figure for 1952. That will push it near the billion dollar mark—considerably above annual capital outlay by the great automobile industry, and in reverse of the all-manufacturing down-trend in capital expenditures.

This is a tip-off on 1952. Any food manufacturer who does not at least keep up with the modernization trend can't engineer himself out of the profit squeeze. And November 4 notwithstanding, Washington can't help you any more than it helps your competitors.

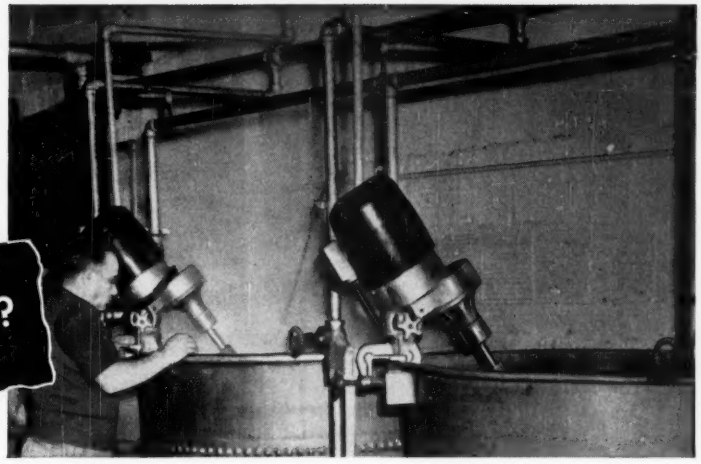
Sincere Labor Relations

Adolphus Busch died in 1913, at age 76, long before modern labor relations techniques were developed. Yet he could have taught many modern executives a thing or two.

Historians report that he was loved by the people in his employ because he was genuinely interested in them as individuals. He called workers by name when he visited the brewery. And the men came to regard their jobs as lifetime positions.

When Mr. Busch died, this headline appeared in a local paper: "Employees Will Be Sincere Mourners at Funeral."

Strive for a similar tribute and you won't have too many labor troubles.



LIGHTNIN Mixers mounted on open kettles for cooking and processing cranberries.

Mixing fluids?

7 reasons why you should standardize on "Lightnin" Mixers...

1. **LIGHTNIN Mixers** protect your investment in equipment. If your process requirements ever change, a LIGHTNIN Portable Mixer can save you the entire cost of a new mixing vessel.
2. **LIGHTNIN Mixers** have an average life expectancy of 10 to 15 years. (Many LIGHTNINs have been in service much longer.) They run day in, day out, with little or no maintenance.
3. **LIGHTNIN Mixers** give you the exact degree of mixing you want. Mixing is easily changed to suit batch conditions.
4. **ONE LIGHTNIN Mixer** can do several jobs. Shaft angle is easily adjusted for special operations like drawing down and wetting fine powders, washing fibers, etc.
5. **LIGHTNIN Mixers** are simple to clean. Smooth lines expose all surfaces and make them easy to get at. Portable models tilt to any angle, or swing out of the tank for cleaning.
6. **LIGHTNIN Mixers** give you widest choice of sizes, speeds, motors, materials, impellers. More than 30 standard portable mixers to choose from. Furnished in stainless steel, or practically any metal you prefer.
7. **LIGHTNIN Mixers** are *fully guaranteed.* Guaranteed against mechanical failure; guaranteed to do the job *right* —or your money back!

***Moral:* It's smart to standardize on LIGHTNIN Mixers for *all* your fluid mixing requirements.**

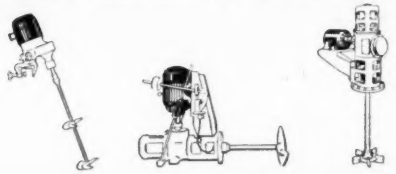
FREE MIXING FACTS

Big 28-page illustrated catalog on portable mixers and their applications, contains mixing data available from no other source. Send for your copy today. Check Catalog B-75 on coupon below.

MIXCO

fluid mixing specialists

SERVING THE FOOD INDUSTRY FOR MORE THAN 30 YEARS



PORTABLE
⅛ to 3 HP.

SIDE ENTERING
1 to 25 HP.

TOP ENTERING
1 to 500 HP.

MIXING EQUIPMENT Co., Inc.

143 Mt. Read Blvd., Rochester 11, N. Y.

In Canada: William & J. G. Greey, Ltd., Toronto

Please send me the literature checked:

- ☐ "24 IDEAS" Folder
- ☐ B-75 Portable Mixers (electric and air driven)
- ☐ B-104 Side Entering Mixers
- ☐ DH-50 Laboratory Mixers
- ☐ B-103 Top Entering Mixers (propeller type)
- ☐ B-105 Condensed Catalog showing complete line
- ☐ B-102 Top Entering Mixers (turbine and paddle type)

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Company_____

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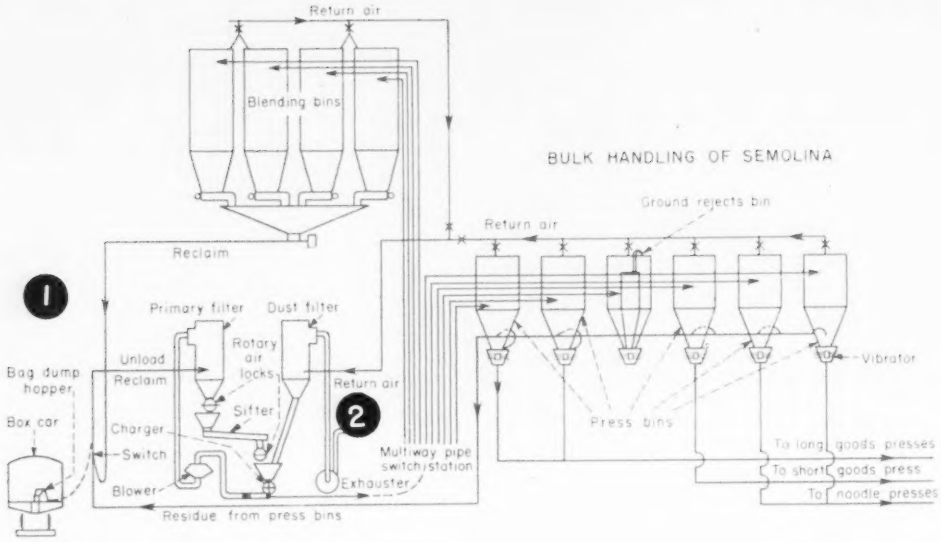
City_____ Zone____ State_____

TURN PAGE FOR FOLDOUT FLOWSHEET →



Making Quality Macaroni Products

Advanced Setup Speeds Output of Long and Short Goods and Noodles

PROCESSING of A-1 grade macaroni products has been streamlined on continuous lines at A. Zerega's Sons, Inc., Fair Lawn, N. J. Outstanding here in attaining high-speed, high-volume output are an advanced materials handling system, automatic macaroni presses, and continuous dryers—all on one floor.

Our accompanying foldout flowsheet graphically illustrates operations on three typical lines—long goods, short goods, and noodles.

Semolina is initially dumped into a portable hopper—Point (1)—and then pneumatically conveyed to a filter and sifter and into storage bins. Blended semolina is now re-sifted and distributed to use bins directly over macaroni presses. Capacity of this Fuller Airveyor system is 10 tons hourly.

RELEGATING ITS OLD TORTUOUS multi-floor operation to limbo, Zerega engineered a striking rebirth by establishing a new continuous, top-efficient—and expansible—1-story operation. Turn to page 78 for the revealing working-tip feature on how it was done.

First to the making of long goods: Flow of semolina and water into continuous presses is automatically controlled. Here, an agitator kneads the dough, forcing it at the same time through an extruder. Machine-feeding of the long strands of extruded dough onto drying sticks is accomplished with an automatic spreader—Point (3). Sticks of macaroni are then spaced on roller chains traveling through continuous dryers—preliminary, intermediate, and final. Finally, the dried strands are cut to length—Point (8)—and packaged. The macaroni is weighed and either packed into cartons that are automatically glued and sealed or fed onto cardboard trays that are machine-wrapped with heat-sealable cellophane.

Preparation of short goods is carried out in this manner: Semolina and water (or egg solution) are fed into a macaroni press. Here, too, the dough is kneaded to the proper consistency and extruded through dies—Point (4). A rotating knife now cuts the macaroni to proper size, and it drops onto shaker screens.

At this point, the macaroni is conveyed through preliminary, intermediate, and final dryers—Point (5). Goods are then filled into bags by machine—Point (9)—and the bags are sealed.

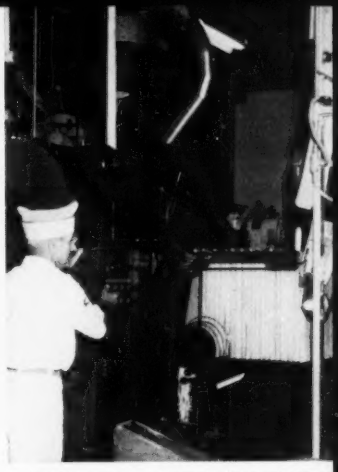
Manufacture of egg noodles is somewhat different. An egg solution, prepared in a stainless steel mixing tank, is metered into the mixing chamber of automatic dough-sheet formers—Point (6)—where it is mixed with a continuously proportioned amount of flour. The dough is formed into a sheet by three pairs of rolls and wound on a spool at a rate of 1,600 lb. per hr. Before going to the last two sets of rolls, a criss-crossing device folds the sheet.

A noodle cutter—Point (7)—now slits the sheet of dough into ribbons, and a rotating knife snips them to the desired length. Noodles are next pneumatically conveyed to a hopper, from which they drop onto a flight conveyor going to an automatic spreader that distributes them onto a wire-mesh belt traveling through a continuous dryer.

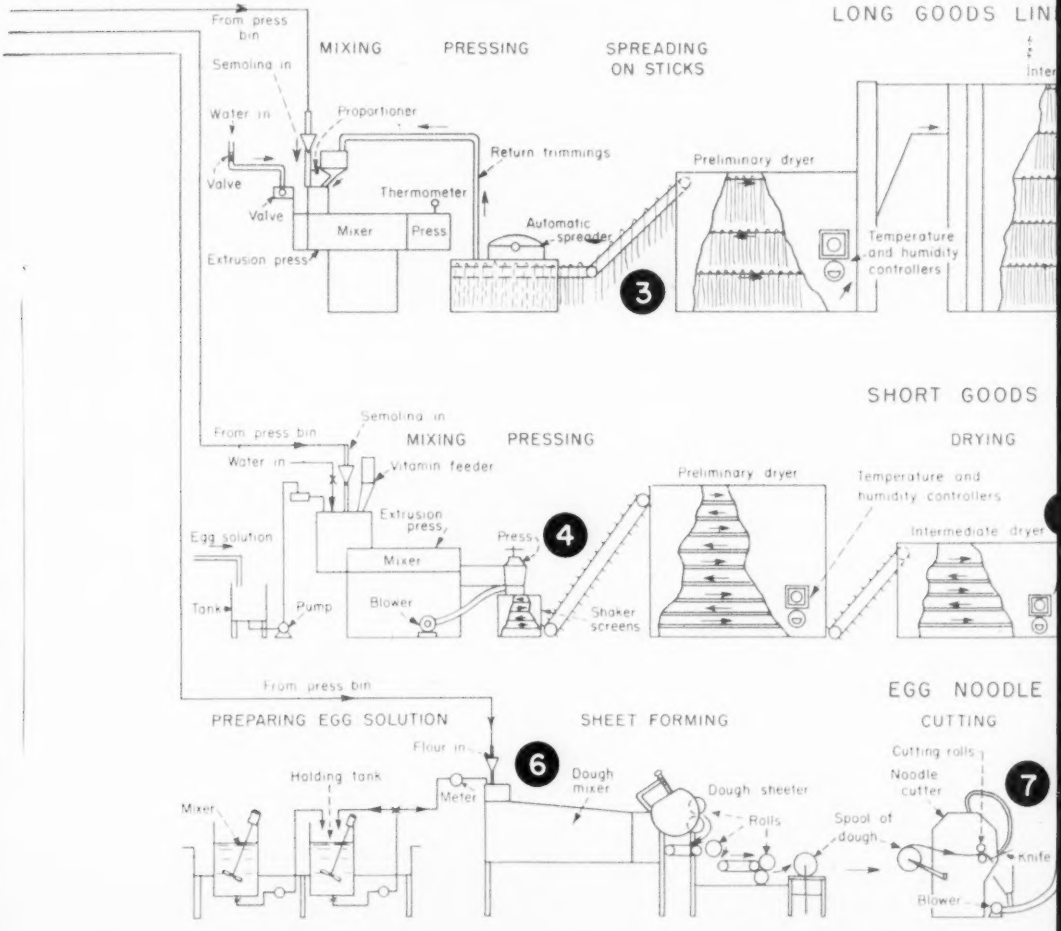
Noodles finally go to the packaging department, where they are machine-filled into heat-sealable cellophane bags.

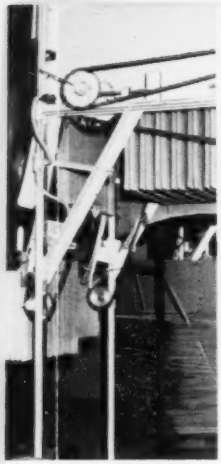
1 **SEMOLINA** is first dumped into hopper and air-conveyed to the plant.

2 **LINE** connects at switch station serving bins.



3 **FROM** macaroni press, long goods ar onto sticks and conveyed through dry





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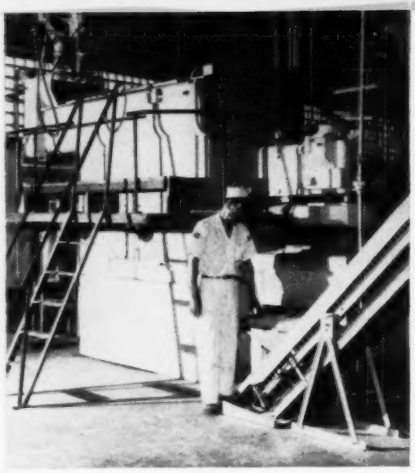
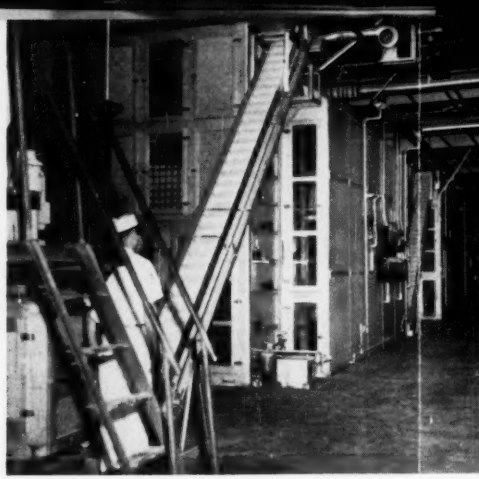
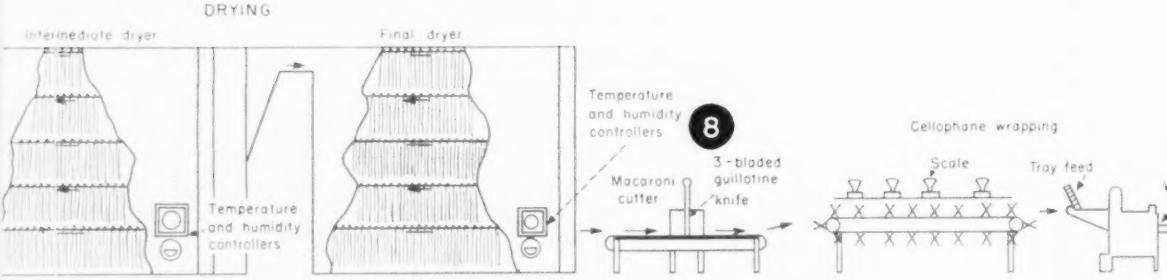


4 **IN** short-goods press dough is mixed, extruded, and cut to length.

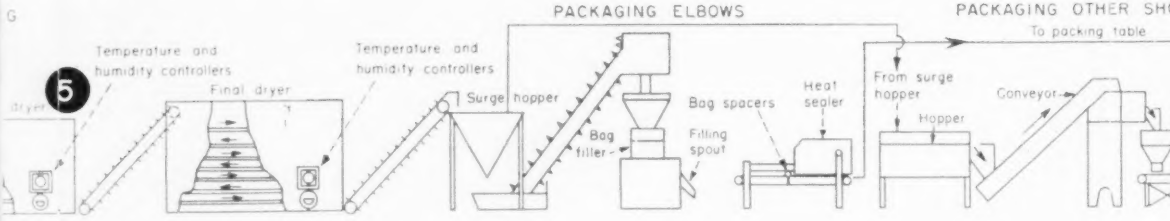


5 **DRYERS** are continuous. They comprise preliminar intermediate, and final units.

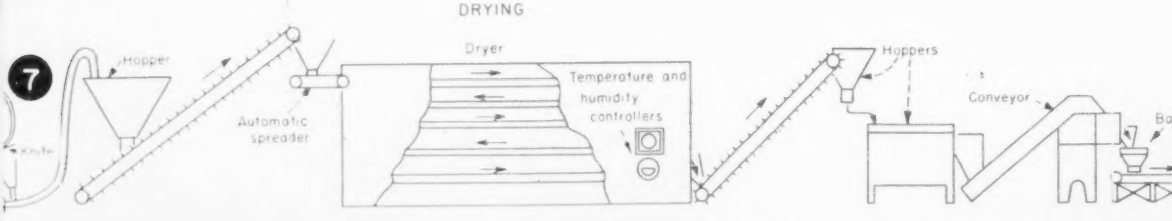
LINE



DS LINE



DLE LINE



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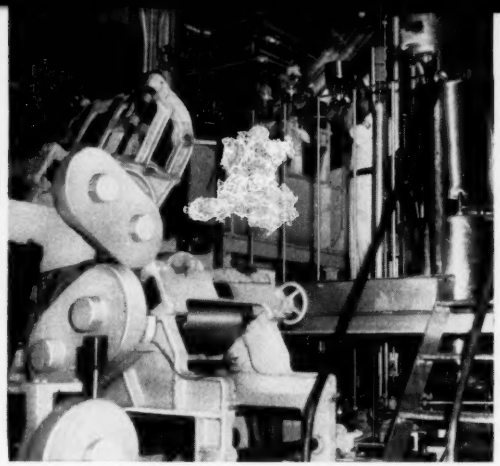
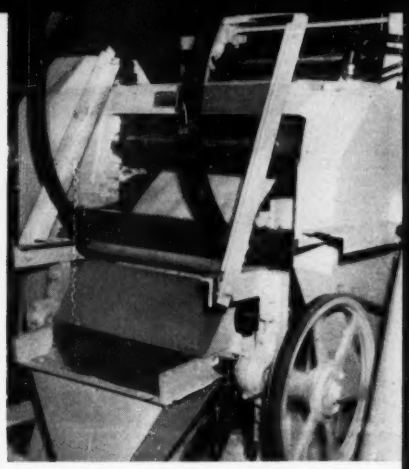
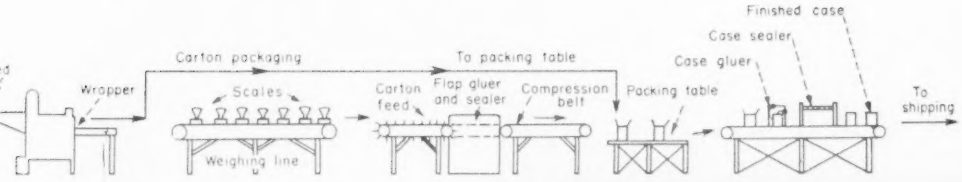


6 **THIS** dough-sheet former automatically prepares noodle dough, rolls it into sheet.

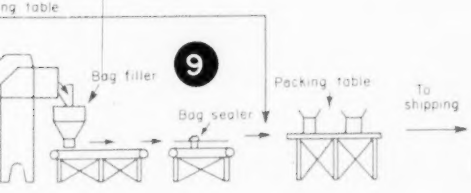


7 **SHEET** of noodle dough is slit and cut to length. Noodles then go to dryer.

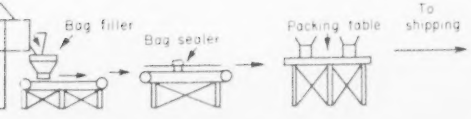
FE PICTURE – FLOWSHEET NO. 48

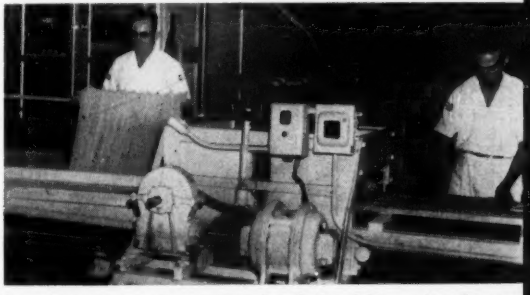


THER SHORT GOODS



PACKAGING





8 **CUTTER** chops **macaroni to length for tight, neat package** and to eliminate U-shaped ends.

9 **MACARONI** is machine-filled into cellophane bags which are then heat-sealed. Bags are then packed in cases.

Schoettle Case Histories:

true story of a

Purchasing Agent Up a Tree

CASE HISTORY #31 Wow! Friday! Someone suddenly discovers inventory on a very important box is down to zero—and Monday's deliveries depend upon these boxes! Frantically, wires burn to the Schoettle plant. Purchasing agent says he's "up a tree" and we have to get him out! . . . our customer* for 17 years . . . practically out of business without boxes, etc., etc. Schoettle goes to work . . . cardboard made that night . . . men and machines hum 'round the clock Saturday and Sunday. Monday, we deliver 2-color boxes. Ask *that* P A about Schoettle!

CASE HISTORY #23 Here's a case where Schoettle took a Purchasing Agent "out of a tree" and put a halo on his head! Company* needed a carrier-pack to hold 3, 4, 6 cans for multiple sales. Nine competing companies submitted suggestions . . . all N.G.! Schoettle made a thorough study of the field . . . devised a smart new construction . . . turned it over to the P A. Purchasing Agent got some mighty kind words from Board of Directors . . . Schoettle got the order. P.S.: Schoettle thrives on anonymity and reflected glory . . . and good paper boxes delivered on time!

Schoettle customers are seldom "up a tree" for paper boxes because Schoettle goes to town for its customers! Inventory slip-ups, sudden orders, sometimes cause major Purchasing Agent headaches. Schoettle has the remedy . . . quality paper boxes delivered ON TIME!

*name on request

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frequent cleanout is
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stays in the line. Rea
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tight.

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brass trimmed. On
an improved self-dr
trapment of line flui
the threads, keeps t
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Crane Wedge Disc Clamp Gate Valves come in OS&Y, inside screw, and quick-opening patterns, all-iron or brass trimmed, screwed or flanged end. Sizes up to 4 in. Working pressures up to 150 psi saturated steam, 225 psi cold service.

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water; crude, fuel, and lubricating oil;
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ir compact design means a better fit
places... a saving on piping in many
l because of the simplified clamp con-
these valves enjoy wide favor where
leanout is essential. The bonnet as-
d wedge disc lift out easily—the body
e line. Reassembling is no problem for
joint always makes up tight and stays

hoice of regular patterns, all-iron or
med. On inside screw all-iron valves,
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of line fluids in the bonnet—protects
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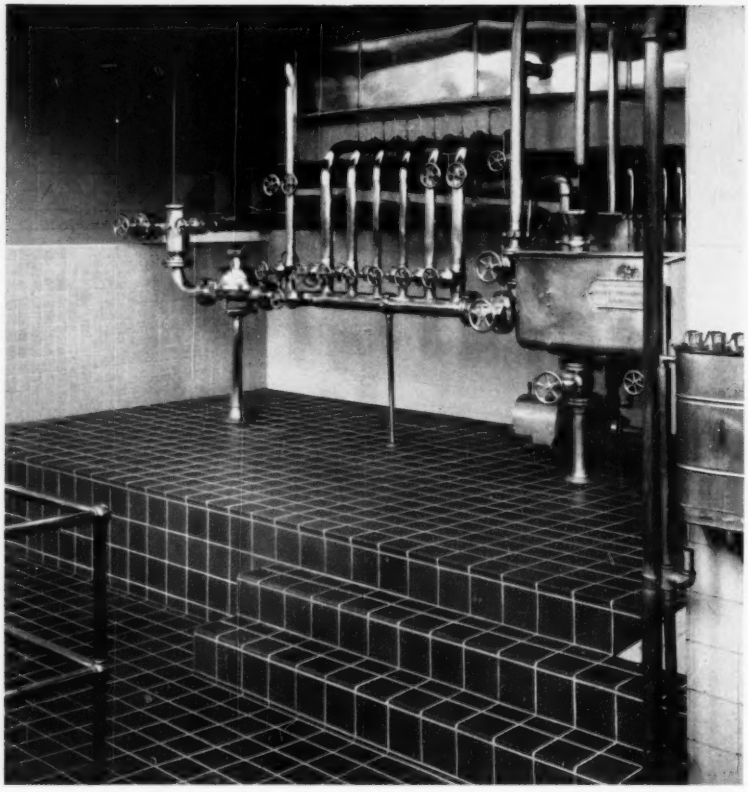

Fehr's new Brewhouse, Louisville, Ky. 4¼" x 4¼" Wall Tile, Color No. L-216. Floor—6" x 6" Carlyle Quarry Tile in Navajo Red.

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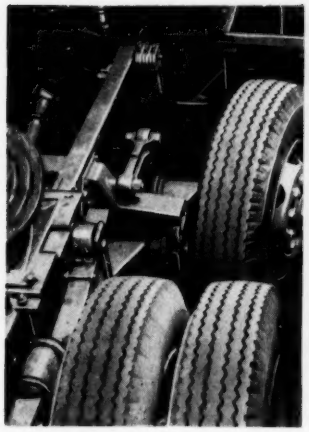
* **Mosaic Tile meets all Food & Drug Administration standards of sanitation.**



CLOSEUPS of pusher axle and tractor unit incorporating it. Left, view from rear shows right-wheel mechanism with tire in turned position. Right, one of Red Ball's tractors which took new axle equipment through grueling road tests.

PAYLOADS INCREASED
By New Pusher Tractor Axle

Unit provides tolerances on axle loadings with non-uniform commodities, thus enabling distribution savings . . . Tractor steering is improved, and there is wide trailer interchangeability

LEGAL HAULING of from 1,500 to 4,000 more pounds of payload with tractor-trailers is stated achieved with development of a new type of axle equipment.

Briefly, the device is a steering, non-driven, two-tired pusher-tractor axle. It is interposed between the regular front and rear axles of a two-axle tractor.

This new equipment has now been tested over 2,000,000 miles of highway by the Red Ball Motor Freight Lines, Inc., of Dallas, Tex. It is being offered by the White Motor Co., of Cleveland, for use on this manufacturer's current, conventional Model 3000 and diesel tractors.

Seeming Contradiction

Though apparently paradoxical, the statement is readily verified that use of the pusher axle will permit carrying greater payloads without increasing allowable gross-laden weights. It's done by calculating net payloads obtainable with regular tractors and trailers—limited first by gross weights and then by separate axle loadings—against the physical impossibility of loading the tractor front axle to its allowable limit.

Take the case of a two-axle tractor and a tandem-axle trailer operating in a state with gross allowable weight of 58,000 lb. Further, concede an axle loading of 18,000 lb. for a single axle and 32,000 lb. for a tandem.

Here, with a maximum obtainable front-tractor loading of 6,500 lb., the maximum obtainable gross weight is 6,500 plus 18,000 plus 32,000 lb., equaling 56,500 lb. This is 1,500 lb. less than allowable gross weight of 58,000 lb. Thus, in a state having a maximum gross weight of 59,000 lb. and the same axle loadings, it is revealed that maximum obtainable axle loadings would be 2,500 lb. less than the allowable gross weight of 59,000 lb.—again 56,500 lb.

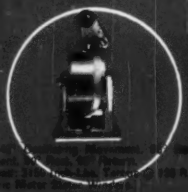
But with the additional allowable pusher-axle loading of 9,000 lb., the combined axle loadings can be made to equal the gross allowable weights, thereby obtaining increased payloads.

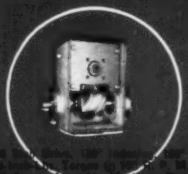
And there is the added advantage of not having to load the rear tractor axles or the trailer axles to legal limits.

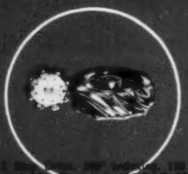
Methods Compared

In practice, with a regular tractor, such increased loading is impossible, except with a uniform product. For the result is usually overloading of tractor rear axle and underloading of trailer axle. Consequently, there is delay and expense in the necessity of physically shifting a load so as to eliminate rear tractor-axle overload.

With the pusher axle, this is avoided. Here, the total allowable axle loading is 64,000 lb.—or 6,000 lb. more than allowable gross weight. This is computed with a base gross allowable weight of 58,000 lb. Disbursement of weight would indicate a tractor front-axle loading of 5,000 lb., and a combined allowable rear tractor axle loading of 27,000 lb., made up of 9,000 lb. for the pusher axle, 18,000 lb. for the regular axle, and 32,000 lb. for the tandem-trailer axle. Pictorial breakdown of these







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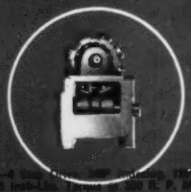

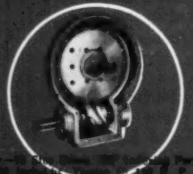

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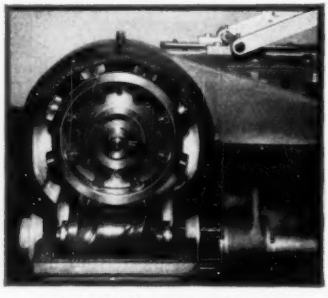

Roller Gear Drive for automatic machine with 8 rollers and 8 stops per revolution of the gear. Indexing period is 180° deg of cam rotation; cam speed, 240 R. P. M.

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figures is given in lower-right diagram.

Thus, there is a tolerance for non-uniform loading of 6,000 lb. between the two sets of axles—an average of 3,000 lb. per axle. And this is adequate to prevent overloads on either one.

King Pin Tie-In

Another advantage of the pusher axle is that the king pin on the fifth wheel connecting the trailer and tractor is adjustable. Specifically, it may be set 8 in. behind the center of the two axles instead of 15 in. ahead as on a standard tandem-axle tractor. This permits the pusher-axle-type tractor to hook up to any trailer with landing gear only 8 ft. from trailer front.

The pusher axle weighs 1,350 lb. with 10.00x20 tires. It steers in coordination with the tractor's front-axle steering. The axle is independently mounted with steering knuckles at each wheel. Actuation is through a drag link and correspondent tie rod connection.

The ratio between the turn angles of tractor front axle and pusher axle is 3 to 1. Thus, if front wheels turn 21 deg., the pusher wheels will turn 7 deg.

Roadability Data

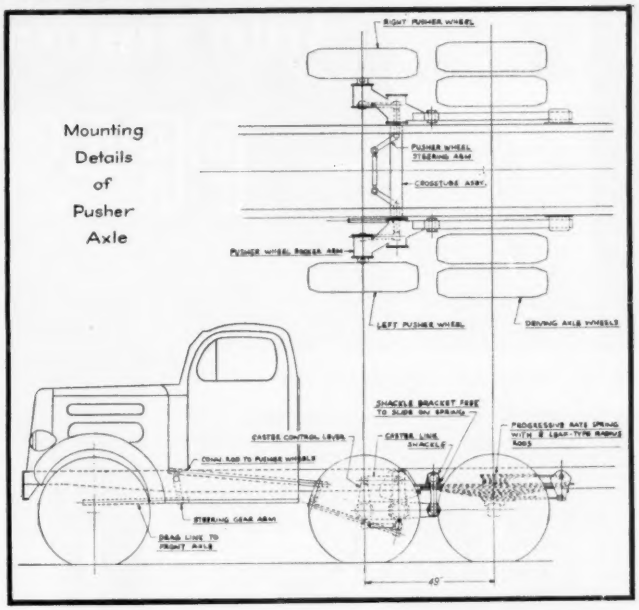
Over-the-road tests of dual steering of the pusher-axle tractor, in all kinds of weather and on all types of road surfaces, are claimed to show improved roadability. Increased safety in operation against skids and jackknifing was noted. Due also to this special steering, the life of pusher-axle tires is lengthened because of reduced scuffing and dragging.

In designing the pusher-type axle, White engineers worked to balance the allowable axle loadings to equal gross allowable laden weights. Here, aim was to transfer more weight to the tractor front axle.

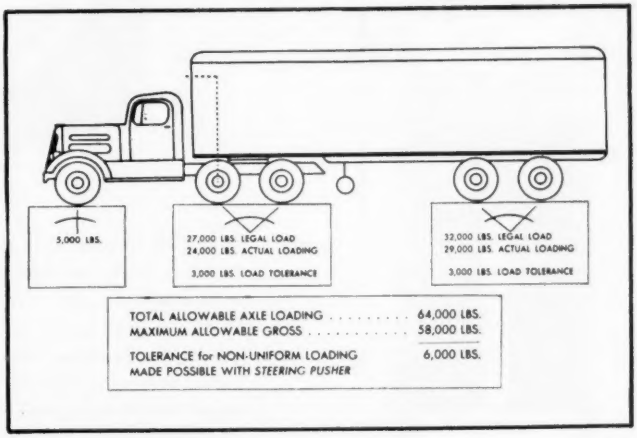
Development of the cab-over-engine chassis has been the principal means to date of accomplishing this result. But even this has not been 100 percent successful, especially in states employing the "bridge" formula—where gross allowable weight may be less that the weight of the conventional tractor chassis because of the cab-over-engine's nominally shortened wheelbase.

But with pusher-axle tractor design, the combined axle allowable loadings exceed the gross allowable weights, as was previously illustrated, with tolerances on both the tractor rear axles and the trailer axle. These tolerances save substantial loading time since—in most cases—it is unnecessary to spot load, weigh axles separately, or redistribute the load as is regular trailer practice.

Unit Details . . .



. . . and Load Factors

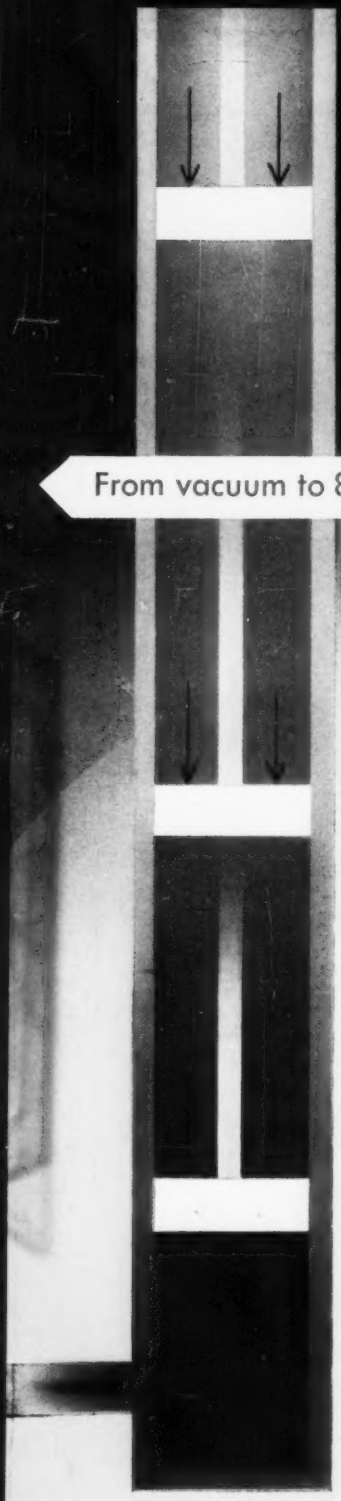

5,000 LBS.
27,000 LBS. LEGAL LOAD
24,000 LBS. ACTUAL LOADING
3,000 LBS. LOAD TOLERANCE
32,000 LBS. LEGAL LOAD
29,000 LBS. ACTUAL LOADING
3,000 LBS. LOAD TOLERANCE
TOTAL ALLOWABLE AXLE LOADING . . . . . 64,000 LBS.
MAXIMUM ALLOWABLE GROSS . . . . . 58,000 LBS.
TOLERANCE for NON-UNIFORM LOADING MADE POSSIBLE WITH STEERING PUSHER 6,000 LBS.

Summing Up

The 27,000 lb. allowable weight on the pusher axle and the tractor-drive-axle combination is legal in all states except Michigan, which allows 26,000 lb.

In the last analysis, advantages of the new equipment can be measured in solid dollar savings. For in hauling from 1,500 to 4,000 lb. more payload per trip, food processors will reduce their overall distribution costs correspondingly.

Those moving loads by contract or common carriers should evolve the same benefits. For the benefits are to be reaped both in a company's operation of its own tractor-trailers and in moving loads by contract or common carrier.



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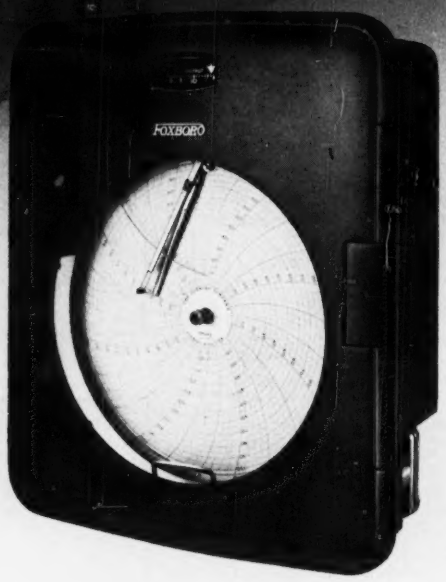

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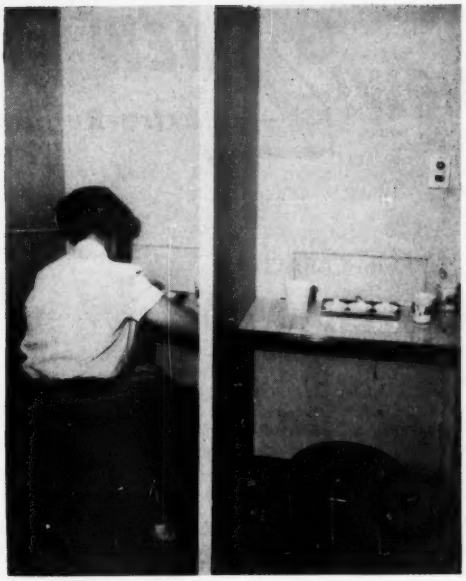

. . . directly to taster

Samples of bread are slipped through special panel by Author Moser (left photo) directly into taster's booth (right photo). Breads made both with nonfat soy flour and with nonfat dry milk were organoleptically compared. Test room is odor-free and temperature and humidity constant. Light control minimizes color differences.

Soy-Flour Bread Wins Its Place

Tests Show Best Amount for Quality Loaves

No significant flavor differences are detected when taste panel compares soy goods with dry milk type. Crumb equally soft, rate of firming the same

C. W. OFELT, A. K. SMITH, C. D. EVANS, and H. A. MOSER

Northern Regional Research Laboratory, Bureau of Agricultural & Industrial Chemistry, Agricultural Research Administration, USDA, Peoria, Ill.

Soy flour is a comparatively new product which has been greatly improved in quality and uniformity during its short history. Original enthusiasm for soy flour encouraged its production by numerous processors.

There have been three general types of soy flour—full-fat, low-fat, and defatted.

Since little processing information was originally available for a given end use, these powders lacked uniformity in chemical and physical properties. Some were not suited for bakery use, but still found their way into baked products. The resulting confusion created a prejudice against the use of soy flour which still exists in many places.

The trend has been toward a reduction in the number of processors and a concentration on two general types—the full-fat and nonfat soy flours. In addition, there are some special types with improved characteristics. A recent survey has revealed good uniformity in production within individual plants as well as among the several producers.[1]

Nonfat soy powder is an excellent source of highly nutritious vegetable protein. It is capable of fortifying the wheat bread proteins and furnishing other desirable properties to doughnuts, crackers, cakes, and other bakery goods.

The comparatively high lysine and valine content of soybean proteins makes up for the deficiency of these two essential amino acids in wheat flour proteins.[2] This was demonstrated in a study on the effect of soy flour and nonfat milk solids in white bread on the nutritional quality of the protein.[3]

In this case, the nutritional quality of the bread protein was equal for white breads containing soy flour and milk solids in 3 percent amounts. Moreover, both types of bread were significantly better than white water bread. The same studies also showed that 5 percent white soy bread was at least equal to the 6 percent white milk bread. And both were significantly superior to white water bread.

Nonfat soy powders have characteristic flavors. These can be varied by proper selection of beans and proc-

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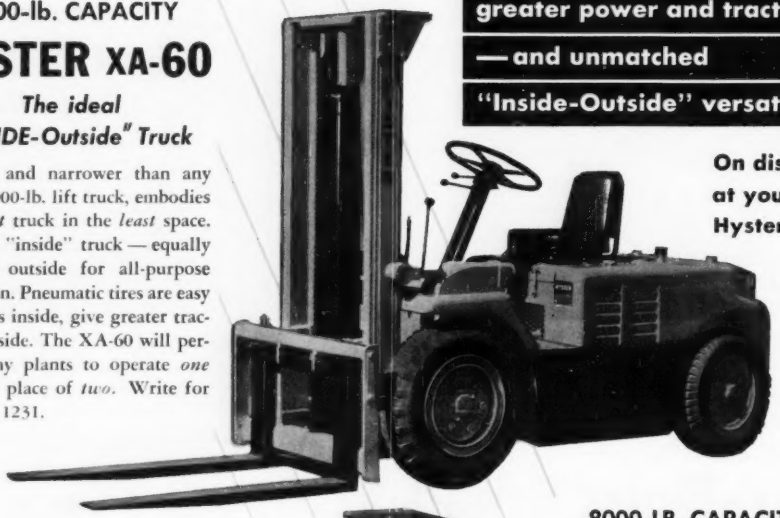

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essing techniques. Nearly all of the flavor of the raw bean can be eliminated by steam treatment. In debittering soybeans, the flavor is partly destroyed by the moist heat and partly eliminated by steam distillation. Thus, it is apparent that the baking of a bread dough is a major factor in reducing the flavor of the soy flour.

The effect of soy flour on the flavor of wheat bread has been a highly controversial issue. Statements could be based upon opinion or isolated single observations, since there are no factual data.

Finney[4] stated that wheat bread had more desirable flavor than that baked from soy and wheat flour blends. Also bread made with 8 percent of full-fat flour was less desirable in flavor than that made with 4 percent. Too, full-fat soy flour is more easily detected than oil-free flours.

Preliminary Studies

Since previous investigators have shown that flavor and nutritive value of bread increase with increasing amounts of soy powder, we chose, in our investigations, a 5 percent level as representing an optimum for nutrition without deleterious effects on flavor.[3,5,6]

Our observations, made over an extended period on commercial breads containing 5 percent nonfat soy flour did not agree with findings of Finney.[4] Our findings indicated that the flavor of 5 percent soy flour is too low to be of any concern to the baker.

Using commercial methods and formulas, the present study was designed to determine if untrained people can detect a flavor difference between breads made with 4 percent of nonfat milk solids and 5 percent nonfat soy flour.

Test Methods

The breads were baked from a hard red winter wheat flour blend with a protein content of 11.8 percent and an ash content of 0.43 percent (all on a 14 percent moisture basis). The flour was bleached with Novadel and the diastatic activity adjusted by the addition of 0.25 percent of malted wheat flour. Nonfat milk solids came from a commercial source, and it had previously been tested to insure that the milk had good baking quality. A composite soy flour was obtained by mixing eight samples, two obtained from each of four manufacturers over a two-month period.

Baking was carried out in the pilot bakery in the Department of Milling Industry, Kansas State College, Manhattan, Kan., under contract with the Northern Regional Research Laboratory. Doughs were run in commercial size equipment by staff members of the bakery section of the department.

Formulas and methods of handling sponges and doughs appear in Table I.

Proofed to optimum height, doughs were baked 26 min. at 450 deg. F. The bread was scored by staff members at Kansas State College on the day following each bake. Grain, texture, and color scores for the three different bakes are shown in Table II.

The relative constancy of the scores for milk bread reflect the experience of the bakers with this formula. And the improved score for the soy bread on the third day shows that it is possible, with experience, to produce soy-containing bread with grain and texture equivalent to commercial milk-containing bread.

Bakers observed that the soy doughs tended to be slightly more sticky than the milk doughs. No difficulty was noted, however, in putting the doughs through make-up equipment.

Impact of this soy-flour composite on the color of the bread crumb was more severe than was observed with any (except one) of a series of 25 commercial samples examined at NRRL for baking characteristics. It is apparent that the color factor is of major importance, and every effort must be made to overcome non-uniformity in this respect if wide usage of the product is to be anticipated.

Three bakes, or a total of 420 loaves, were made at weekly intervals. Each consisted of 70 loaves of bread containing 5 percent of nonfat soy flour and 70 loaves containing 4 percent nonfat milk solids.

As soon as the loaves had cooled, they were double-wrapped in waxed paper, packed in standard shipping cartons containing 20 1-lb. loaves, and rail shipped for delivery at the Northern Laboratory the following morning. Upon arrival, the bread was divided into two lots—one for immediate evaluation and the other stored for evaluation as 4-day-old bread. Storage was in tin-lined drawers in a room maintained at approximately 78 deg.

Formulas, Test Methods and Results

TABLE I—TEST FORMULAS and Sponge and Dough Procedures

Ingredients	Soy Formula		Milk Formula	
	Sponge (Percent)	Dough (Percent)	Sponge (Percent)	Dough (Percent)
Flour	70	30	70	30
Nonfat soy flour	5	....	....	....
Arkady	0.5	....	0.5	....
Malt	0.5	....	0.5	....
Salt	1.0	1.0	....	2.0
$KBrO_3$	0.001	....	....	....
Yeast	2.0	....	2.0	....
Water	72	72	70	70
Dextrose	.....	5.0	....	5.0
Shortening	.....	4.0	....	4.0
Nonfat milk solids	.....	....	....	4.0

Sponge time—4 hr.
Sponge temp.—77 to 78 deg. F.
Dough mixing time—12 min.
Dough mixing temp.—78 to 79 deg. F.
Dough floor fermentation—30 min.
Intermediate fermentation—20 min.

TABLE II—BREAD SCORES for Three Bakes

Bake	Soy			Milk		
	Grain	Texture	Color	Grain	Texture	Color
1st	90	88	80	95	95	95
2nd	88	88	80	93	93	95
3rd	95	92	80	90	90	95

TABLE III—SOFTNESS COMPARISON of Soy and Milk Breads by Compression Method with a Bloom Gelometer

Bake	Age of Bread (Days)	Weight of Shot for a 4 mm. Compression in Bread	
		Nonfat Soy Powder (5 Percent)	Nonfat Milk Solids (4 Percent)
1st	2	133	133
	4	140	151
2nd	2	124	128
	4	168	167
3rd	2	139	139
	4	169	176

TABLE IV—TASTE Panel Results

Test No.	Age of Bread (Days)	No. of Judges	No. Correct Selections	Correct Selections (Percent)	Percent Correct Identifications for Significance at 5 Percent Level
1	1	232	74	31.90	39.66
3	1	227	82	36.12	39.65
5	1	226	64	28.32	40.27
Average	...	.....	....	32.11	.....
2	4	221	75	33.94	39.82
4	4	227	79	34.80	39.65
6	4	230	85	36.96	39.57
Average	...	....	....	35.23	.....

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F. and a relative humidity of 55 percent.

It has been said that the addition of soy flour to bread increases crumb firmness. Our material seemed well suited for a check on this observation. Consequently, crumb compressibility was determined on the two types of bread, using a modified Bloom gelometer with a 1-in.-dia. plunger, a compression distance of 4 mm., and bread-slice thickness of 0.5 in.

The values are averages of four to eight loaves taken from each bake, and all slices except the three end ones were tested. The number of loaves tested for the 4-percent milk bread and the 5-percent soy bread was the same for each bake.

Results are shown in Table III, where it is indicated that the crumb of the bread containing 5 percent nonfat soy flour is as soft as that with 4 percent nonfat milk solids. Also, the rate of firming of the crumb with age is about the same for each bread.

Organoleptic Evaluation

Flavor is such a dominant factor in the acceptance or rejection of any product by the consumer that its evaluation and measurement is of major importance. To attain a high degree of reliability in the measurement of flavor changes in edible oils, this laboratory has special facilities—previously described[7]—for conducting such taste tests.

Taste-test rooms are equipped with individual air-conditioning units to provide fresh, odor-free air at a given temperature and relative humidity. Color and intensity of lighting may also be controlled. Tasting is carried out in individual booths.

Personnel experienced in flavor evaluations was used in these bread-flavor studies. No attempt was made to employ a panel to estimate the amount of the soy flour. The object was simply to determine if the average consumer can differentiate between the flavor of breads containing nonfat milk solids and nonfat soy flour.

No selection of tasters was attempted. The 300 employees of this laboratory were used as a test group, after being informed of the objectives and the methods to be used. Included in this group, however, were 25 persons trained to evaluate edible oils. Each had served two to five years on an edible-oil taste panel. An additional group of 20 persons had served for a short time on a preliminary bread-tasting panel.

The triangle test method was used to determine if the panel could detect flavor differences between the two bread samples. In this test, members of the panel know that two of the

three samples presented to him are identical. The problem is to identify these two. Since a choice of three combinations is possible, the probability of choosing the correct pair on the basis of pure chance is 33.3 percent, provided there is no difference between the two breads. Tables[8] are available to determine when results vary significantly from this percentage.

After removal of the crusts, the bread slices were cut into ½-in. cubes. A random order of presentation was established and coded samples were presented to the tasters. Sufficient bread for two tastings was supplied. Tasters were allowed the time required to reach a decision, since a definite selection was necessary for proper statistical interpretation of the data.

Taste-test results are summarized in Table IV. These results show an average percentage correct selection of 32.11 percent for day-old bread, 35.23 percent for 4-day-old bread, and an overall average of 33.67 percent for all six tests. As indicated, the theoretical value for correct selections is 33.33 percent when there is no flavor difference between samples.

No significant difference between the flavors of the two breads was detectable in any of the six tests. Selections made by the testers trained to evaluate edible oils indicated they could not detect differences in bread any better than could the laboratory personnel as a whole. In fact, a greater variation of the number of correct responses was observed from test to test for the oil-panel group than for the larger, untrained group—a result typical for a small panel.

A graphical analysis was made of the number of tasters vs. the number of correct responses as the tests progressed. These results show that panels of more than 100 must be used in this type of evaluation for dependable results. They also substantiate previous observations that evaluations of consumer-taste responses obtained with small panels are subject to large errors.

Only three out of 300 tasters were able to make 100-percent correct selections. One was correct in all six tastings, and two, who tasted five times, turned in perfect scores. Four made five correct selections out of six tastings, and one made four correct selections out of five tastings.

Since the probability, through pure chance, of getting all six selections correct would be 1 in 729, it appears that a few persons were able to detect a slight difference in the flavor of the two samples of bread. It is not known whether the discernible flavor difference was imparted to the bread by milk solids or soy flour.

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—*End*—

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Letters to the Editor

—Continued from page 114

The electrode arrangement, as described in Mr. Bullock's patent, has been thoroughly investigated by The Quaker Oats Co.'s electrostatic research engineers, and found not to be satisfactory in meeting the requirements of corn and most other electrostatic applications, particularly in separations of larger particles such as corn.

First, I would like to deal with the matter of disastrous explosions caused by electrostatic separation. To qualify, I would like to state that my opinions are formed by 38 years of continuous association with, and direction of, the technical and practical problems involved in the art of electrostatic separation.

I have been associated, directly or indirectly, with at least 90 percent of all commercial electrostatic separation installations that have been made in the United States and foreign countries. And I have obtained 48 U. S. and foreign patents dealing specifically with the art of electrostatic separation, equipment design, and process applications.

In this length of time, I have never heard of, nor have I been able to locate, any notice or publication about explosions or fires in practical commercial applications caused directly by electrostatic separating equipment.

Mr. Bullock suggests a set of conditions (which are not definitely known) that might bring about a fire or disastrous explosion, such as pieces of metal bridging the gap between the grounded and charged electrode or an accumulation of dust, chaff, or fumes. Mr. Andrews' general reference in his article to high resistance as a preventive factor is only one provision in explosive hazard controls. Other provisions, both mechanical and electrical, are provided.

In present-day installations, expert attention is given to the preparation of the feed going to the electrostatic separator, including the removal of all magnetic and non-magnetic metallics, as well as the removal of dust, chaff, or fumes. The average electrostatic installation today is made just about as dust-proof as any office or research laboratory—not only as a matter of good housekeeping, but as prevention of a possible given set of conditions which it is thought might possibly cause an explosion.

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equipment has been accomplished over a period of approximately five years' research, engineering and investigation. Five commercial installations of Coronatron electrostatic equipment have been made in the company's plants and are now cleaning approximately 6,000 bu. of corn per hour.

Two separating units alone, in Akron, can clean 2,500 bu. of corn per hour. This indicates that the hazardous explosion possibilities were very thoroughly investigated and the equipment designed in accordance with best recommendations of electrical experts, Insurance Underwriters, and long-experienced, expert explosive engineers of the Bureau of Mines. Therefore, electrostatic equipment furnished by The Quaker Oats Co. has been well proven and is considered perfectly safe for its recommended use.

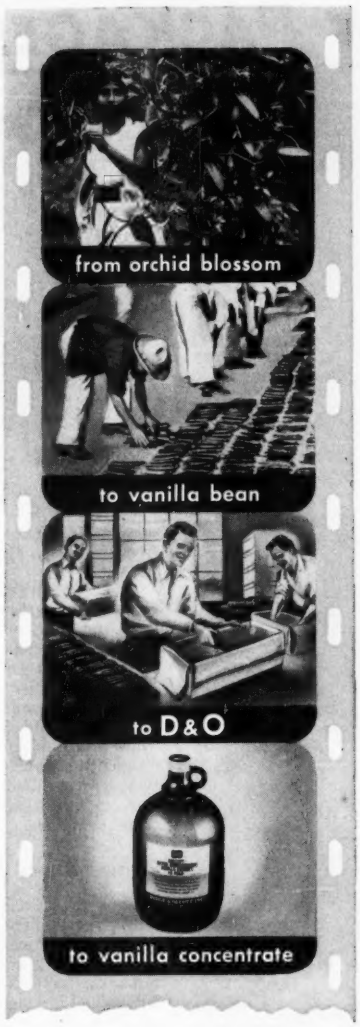
It must be recognized that these requirements and the advice of the Underwriters and Bureau of Mines—which have been applied to the coal, mining, metallurgical, explosive, chemical, food, and other industries—have tremendously reduced any explosive hazards, and excellent progress has been made during the past ten years.

Makes Several Types

With regard to the second comment of Mr. Bullock, regarding plans for commercialization, the Coronatron electrostatic equipment is competitive and available to anyone. The Quaker Oats Co. manufactures seven different types of electrostatic separators and four types of power units for many applications. It maintains the best equipped and most modern electrostatic research laboratory in the world, also a library including all U. S. electrostatic patents issued since 1870—as well as foreign patents and all technical literature available on the subject.

Tests are made for any prospective user. These indicate the efficiency, operating cost, and profits, thus the performance can easily be compared to any other electrostatic equipment performance. It seems to me that the selected method of doing business depends upon the value received by the purchaser in the form of better products, greater sales, and increased earnings. It is entirely up to the purchaser, who will normally evaluate The Quaker Oats Co.'s Coronatron electrostatic equipment (used on the basis of lease and royalty) vs. any other electrostatic equipment which may be available and purchased outright.—*H. B. Johnson, Manager, The Quaker Oats Co., Mechanical Research Department, Rochester Division.*

End (Resume reading on page 115)



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Bakers Aim Innovations at New Sales Targets

Recent trends show bakers are aware of consumers' growing appreciation of taste and nutritive values, increased demand for dietetic foods, power behind good display of merchandise, and giving informative data on packages. These factors have put breads, including the traditional "staff of life" white bread, in an even more highly competitive market. At the same time, they have resulted in new formulas and better designed packages to increase total sales.

Various Methods Used

Some are changing basic formulas, others trying different methods of baking (such as stone hearths and brick ovens), and all are stressing–via information on package–appeal to nutrition- and economy-minded consumers. It is difficult to find a bread on store shelves these days that does not bring to the buyers' attention that it is "enriched", contains "added vitamins", "unbleached flours", "high calcium content", or does not use other eye-catching phrases.

And, with advent of packaged sliced bread it became difficult to purchase any other form. Now, the trend seems to indicate that unsliced bread is also in demand. So, many bakers are supplementing their sliced loaves with unsliced packages.

Though specialty breads have been made and marketed for many years–Thomas Baking Company has been making a Gluten bread since 1880–these were mainly baked by those who specialized in them. However, even the nation's leading bakers of mass-produced white loaves are now adding other types to their lines. This is very apparent from a recent survey conducted in some of the large chain and self-service stores in the East. This survey indicated that the retailer was carrying an average of 18 to 20 different brands, with each brand offering anywhere from 2 to 12 different kinds of bread. Size of loaves range from small family loaf to the extra-large economy loaf.

Pictured on this page are a few of the breads which have recently been introduced or have been popularly accepted. Following are listed some of the features emphasized:

Cornell Recipe Enriched–Messing Bakeries, Inc., Brooklyn, N. Y. Use of wrapper to cite benefits includes 3 "flagged" reasons: Wheat germ for natural vitamin E and vitamin B complex; nonfat milk solids for calcium, minerals and complete protein; soy flour (full value) for calcium and high quality protein; plus enriched, unbleached flour for added vitamins.

Unsalted Loaf–Cushmans Sons, Inc., New York City. Offered to those on salt-free diet, it contains flour, water, sugar, shortening, nonfat milk solids, yeast, malt, yeast food, with no salt substitutes used.

Stone-Hearth Loaf–Henry S. Levy & Sons, Inc., Brooklyn, N. Y. Feature of this item is that it is baked on a stone hearth without pans. It is claimed that this method develops full flavor in bread, as heat from stone hearth comes in direct contact with entire loaf. Made with wheat germ,

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"Wonder" Wheat—Continental Baking Co., New York City. One of country's leading bakers in volume of white bread sold in many sizes. This is its first attempt in so-called specialty field.

"Starlet", "Low-Calorie", Figure-Slimming Loaf—General Baking Co., New York City. This special formula bread aims its appeal at diet-conscious people who still want a nutritious and flavorsome food. Vegetable content is high—including celery, pumpkin, carrots, spinach, parsley, and sesame seed. Company is one of leading bakers of standard white bread entering this specialty field.

Honey Wheat—Purity Bakeries Corp., New York City. One of company's "Taystee" brands finding continued acceptance, it contains white and whole wheat flour to make a nutritious loaf. Company recently introduced a "Wheatality" loaf for those looking for an extra nutritious product.

Television Party Rye—Koster's Bakery Co., Brooklyn, N. Y. Specializing in thin-sliced, midget-circumference loaves, company is pushing this loaf as idea for parties and get-togethers. Slogan on wrapper—"The bread that makes the Sandwiches . . . that makes the Party".

Whole Wheat Plus—Arnold Bakers, Inc., Port Chester, N. Y. Capitalizing on its use of brick ovens to bring out the flavor, this company has been rapidly expanding its variety of loaves. Small family loaves as well as regular size offered. Wrappers stress: "Tailored for Toasting".

Old-Fashioned Whole Wheat—Stonier Baking Co., Inc., Long Island City. Another company well-known for its products' individual and home-style flavor. Both white and whole wheat are offered.

Cinnamon Raisin—S. B. Thomas, Inc., Long Island City. Famous since 1880 for its Gluten bread, this is another of its popular loaves. Other products include date-nut loaf, protein bread, cracked wheat, wheat, English raisin, and whole wheat, as well as English and corn muffins.

Unsliced Loaf—Pepperidge Farm Inc., Norwalk, Conn. One of the better known companies in specialized methods of baking, this firm is answering public demand by putting its bread in unsliced as well as sliced form.

Hollywood—Fischer Baking Co., Newark, N. J. Another diet-loaf, carrying the slogan, "Toast of Hollywood". This bread also has an especially high vegetable content with no fats of any kind added. It includes celery, carrots, lettuce, pumpkin, cabbage, spinach, parsley and sea kelp. Company is one of large processors of white breads as well as a specialist in all forms of rye and darker breads.

"Bond" Home Style Firm Baked White—General Baking Co., New York City. In addition to "Starlet", its newest entry into this field (mentioned above), this loaf is being well received by those who like a firm, solid white bread.

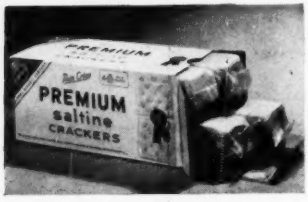
"Silvercup" Wheat—Gordon Baking Co., Long Island City. Well-known nationally for its enriched white bread, company stresses that this loaf is made of a blend of stone-ground whole wheat and white flour.

Better Display for Nuts

Nuts, so popular during the holidays, now occupy a prominent place on the grocers' shelves.

Appreciating the value of good display, Eaton & Eustis Co., Boston, is packaging its "SunniLand" fancy mixed assortment in a chipboard box, over-wrapped with cellophane.

The cellophane is strikingly printed in red and yellow with illustrations suggestive of the sunny South. There is plenty of transparent cellophane over the top enabling one to see the fancy assortment of nuts.



End-Opening Carton

Further improvement in packaging its 1-lb.-unit pack of saltines has been announced by National Biscuit Co., New York City.

To assure freshness, product is pack-

aged in 4 ¼-lb., heat-sealed, waxed glassine wraps, enabling consumer to open but one pack at a time, thus keeping remainder fresh and crisp until ready for use.

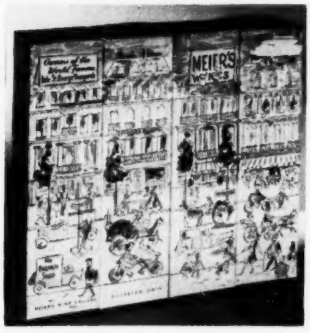
To secure additional protection and convenience, an end-opening carton is now used. Merely running a knife along edge opens box so that desired contents can be removed. It can then be re-closed with flaps inserted into package. It is felt this makes a more positive closure and is more convenient to handle.

Whipped Oleo-Margarine

Best Foods, Inc., New York City, is now marketing an 8-oz. container of "Nucoa" whipped margarine.

Waxed paperboard cartons are furnished by Continental Can Co., Inc., Paper Container Div., Newark, N. J. Top has a cellophane window for good product visibility plus a tab to facilitate lifting of cover.

For Package Data Use Reader Service



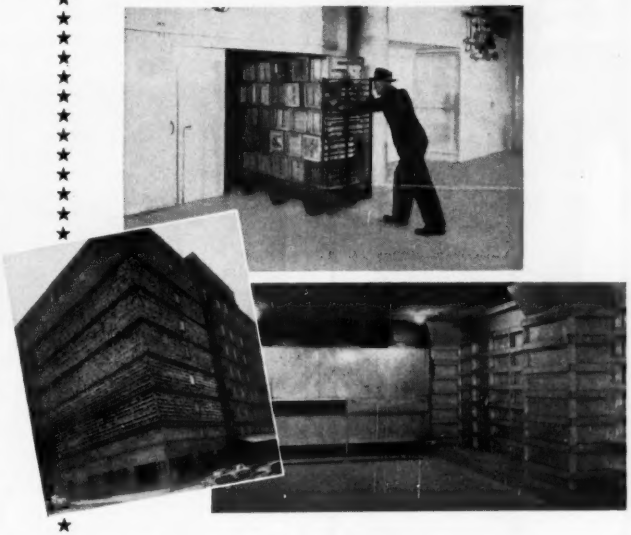
Wine With Festive Air

A new carton, catching the gay atmosphere of Paris—one of the world's greatest wine-loving cities—is being used by Meier's Wine Cellars, Inc., Silverton, Ohio, for a number of its wines.

Designed and manufactured by

At Merchants Cold Storage Company of Cincinnati...

It's VILTER Again



As demand for frozen foods soars, Merchants Cold Storage Company has been quick to expand its sharp freezing and holding facilities. Latest Vilter installations at Merchants enable them to quick freeze 120,000 pounds of products each day in each of several tunnels.

After experience with other equipment, Vilter became the choice for the newest installations at Merchants Cold Storage Company. Vilter Blast Freezers and Vilter Air Units take care of freezing and holding, respectively. A difficult problem, where a long, narrow room had to be cooled, was solved with Vilter Air Units having distributing cowls that can be rotated to direct cooling to points where it is needed most.

In refrigeration that does a better cooling job more economically . . . in engineering help that really *fits* the equipment to the job, Vilter users know that they get more for their money. They save, too, in repair and maintenance costs when they use Vilter refrigeration. No wonder you see more and more Vilter refrigeration.

WRITE FOR BULLETINS 110, 205, 206, 223

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Air Conditioning • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Double Pipe Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pakicers • Pipe Coils • Valves & Fittings

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PRODUCT MIXING
with
LEE DOUBLE-MOTION Center Line Scraper AGITATORS

Standard equipment for over 20 years.

Safe Controlled
RAISING AND LOWERING
with Hydraulic Operated CYLINDER

Operates directly from your present water system

Swings out
FOR EASY CLEANING

Cleaning over kettle means

- No hot messy parts to disassemble
- Savings in time and labor
- No contamination of parts

Our descriptive bulletins on these units will interest you—WRITE FOR THEM.

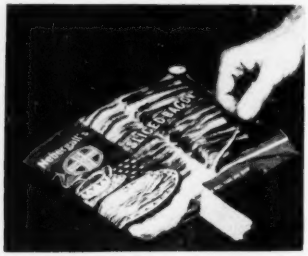
LEE METAL PRODUCTS CO.
416 PINE STREET
PHILIPSBURG, PA.

ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

United Board and Carton Corp., New York City, cartons depict the charm of typical Parisian street scenes. There are the wine carts, mademoiselle walking her dog, a sidewalk cafe, and all the atmosphere of Gay Paree. Atop Hotel Port, on the street known as Tokay Lane, and joined by Aperitif Blvd., is the sign "Meier's Wines".

Multi-colored carton is of muted pastel tones with green, blue, pink, yellow, and black predominating on a white background. It is designed to create a continuous street scene when two or more are placed side by side, making an attractive gift package.

For Package Data Use Reader Service



Flavor Retention, Handling Ease in Bacon Packs

Two bacon packaging developments have recently appeared on the market. Armour and Co., Chicago, is marketing its "Star" sliced bacon in a vacuum-sealed cellophane envelope furnished by Standard Cap and Seal Corp., Jersey City, N. J.

It is claimed this bacon, which is packed and vacuum-sealed under refrigeration, will retain its original sweet-smoke flavor until opened.

Wrap carries well-known Armour identification. Words, "Vacuum Packed" are overprinted in bright yellow outline letters on the transparent window, in such a way as not to detract from product visibility.

Opening of package is accomplished by inserting sharp point of knife at either arrow on front of package and slitting along dotted line.

Improved handling ease is a feature of another package.

Use of "Zip Tape", familiar on packages of cigarettes and confections is now being used on sliced bacon packages of D. E. Nebergall Meat Co., Albany, Ore.

Several advantages are cited in use of the "zip" bag, a development of Dobeckmun Co., Cleveland. Once in the home, bag may be opened sufficiently by pulling opening tape. This permits removal of a few slices at a time while cellophane wrapper remains on balance of bacon. This allows brand identification to remain until last slice is gone.

Flat bag is colorfully printed in red, white, blue and yellow. Easy opening feature is illustrated by a white line running length of bag.

For Package Data Use Reader Service

Dehydrated Chinese Dish

Chinese dinners, made up of a combination of Chinese foods packed in cans, glass and envelopes, have been offered in various forms for some time. A new development, however, in the form of a dehydrated mix has recently been introduced.

Under "Croyden House" label, Croyden Mills, Inc., Suffern, N. Y., a complete vegetable chop suey dinner with quick cooking rice is offered. This 4-oz. package contains a sufficient amount for 3 servings.

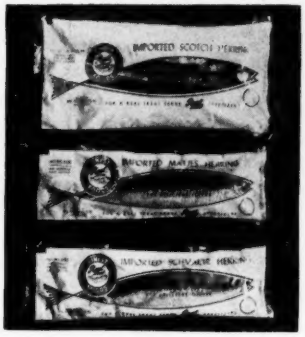
Ingredients include specially processed quick-cooking rice, dehydrated onions, bean sprouts, celery, leaks, corn starch, hydrolized vegetable protein, salt, sugar, and monosodium glutamate.

To prepare, it is necessary only to add contents to 3 cups of rapidly boiling water, boil for 12 minutes, then serve.

New Maple Product

A 100 percent pure maple syrup for syrup making and flavoring has been announced by Cary Maple Sugar Co., Inc., St. Johnsbury, Vt. This was developed by the company in cooperation with Eastern Regional Research Laboratory of USDA.

Nearly 3-gal. of sap are required to produce an 8-oz. jug of this highly intensified pure maple product. Three gallons of pure maple syrup can be produced from 8 oz. of the product.



Salt Herring In Unit Pack

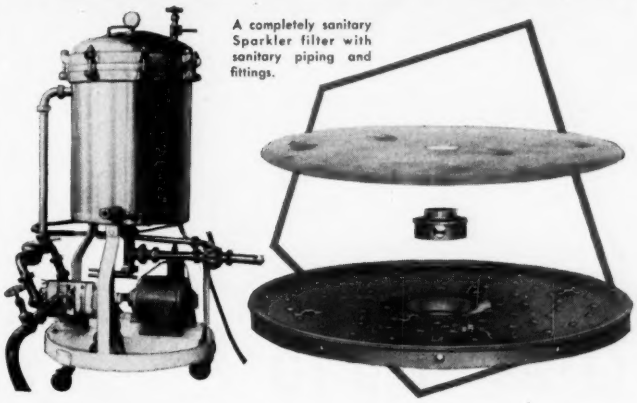
The old fish barrel may be gone but lovers of herring are still with us.

To meet consequent demand, Real Food Products Co., together with Dobeckmun Co., both of Cleveland, have succeeded in developing a convenient and sanitary method of marketing this fish and offering an attractive transparent display package which also possesses good keeping qualities.

Individual units of herring are packaged with a fresh brine solution in a strong, flexible, transparent combination of cellophane and polyethylene.

Package is colorfully printed in red, white, and blue with a large transparent fish-shaped window through which the herring appears.

For Package Data Use Reader Service



A completely sanitary Sparkler filter with sanitary piping and fittings.

You can see at a glance why Sparkler filter plates are the most sanitary plates ever designed:

All surfaces, inside and out, are easily accessible for thorough cleaning. The top screen that supports the filter paper, a center separator, and the bottom plate is all there is to it. These parts can be separated without unscrewing bolts or nuts. The tie rods of the complete plate assembly holds the plate parts firmly together without danger of bypassing.

With most other types of filter plates the inner surfaces are inaccessible and cannot be cleaned; contaminating food particles are locked in and the first run of a new batch frequently must be discarded or rerun through the filter to obtain a pure product.

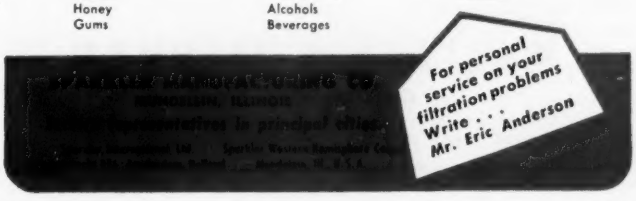
With Sparkler sanitary plates, a pure product is obtained right from the start, and continues pure with fine sharp filtration to the end of the filtering cycle.

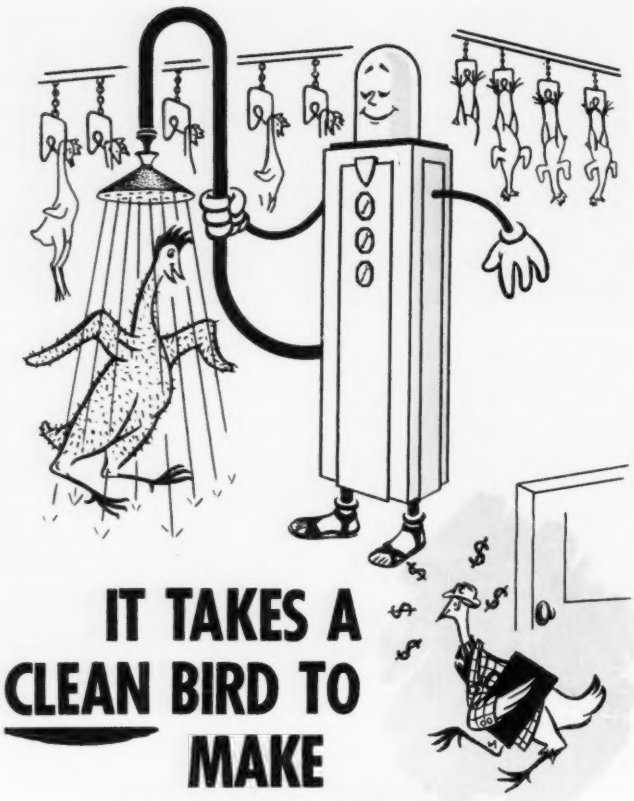
Sparkler filter plates can be removed for cleaning in one unit and a fresh thoroughly clean set lowered into the filter tank. This reduces down time to a matter of minutes.

Sparkler filters are available in stainless steel, monel, nickel, bronze, or Hastelloy, steam or brine jacketed. Available in a range of capacities up to 10,000 G.P.H.

They are efficient in filtering all food products such as:—

Candy Scrap	Liquors	Lard
Chicken Broth	Milk	Deep Frying Fats
Cider	Molasses	Beet Sugar Syrup
Egg Albumen	Syrups	Beer
Extracts	Vinegar	Wines
Flavors	Fruit Juices	Whiskies
Honey	Alcohols	
Gums	Beverages	





IT TAKES A CLEAN BIRD TO MAKE A CLEAR PROFIT

It takes a lot of scrubbing and rinsing to get a bird ready for market, but it's the chicken that *looks* clean, *smells* clean and *is* clean that is its own best salesman.

In-Plant Chlorination helps you get a clean bird to market, and move a marketable bird off the shelf. But it does more than that, for process water chlorinated by Wallace & Tiernan lowers the bacteria count, eliminates slime growths, helps you keep a *cleaner* plant. That means reduced production costs, greater profits.

For full information about In-Plant Chlorination and how it will help you clean up for profit, write to:

LONGER SHELF LIFE

In-Plant Chlorination permits 24-48 hours longer shelf life for your birds, too.

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NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES 1-41

Macaroons Continuously

—Continued from page 97

ing to the conveyor, a mixture of flour and shortening is spread upon it directly in front of the cookie cutter.

The conveyor takes the cookies through the 100-ft., gas-fired, recirculating oven in about 12 min. Oven temperature is automatically controlled so that it does not vary 2 deg. either way from 420 deg. F. The temperature is 440 deg. F. at the front burner and 400 deg. F. at the rear one. The macaroons emerge a pleasing medium brown.

Baked macaroons are automatically transferred from the steel-band conveyor onto a cotton-web belt going to the inspection, wrapping, and boxing stations. The cookies peel off the conveyor without sticking or causing cripples. As a result, considerable handling has been omitted—a notable improvement over the former method which, as stated, required manual removal of the kraft paper at this point.

At the end of the conveyor, macaroons are inspected and manually transferred to the automatic wrapping machine. Wrapped cookies are then placed in wooden trays for in-plant movement to the macaroon cartoning department or to the packaging lines where cookie assortments are put up in boxes. The variety box has met with high consumer approval.

Schoenith's newly engineered line permits greater flexibility, since production of each variety of cookie is closely scheduled to daily sales volume. Thus, the company can quickly switch from one variety to another by simply changing the roller on the forming machine.

The company distributes its products by its own fleet of home delivery trucks, thus controlling freshness and quality of its products from ingredients to consumer's door. Production is scheduled daily to meet the demand for each item.

End (Resume reading on page 98)

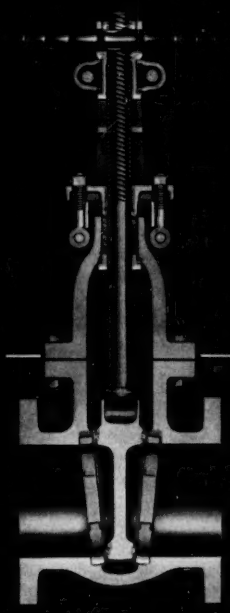
Deep Fat-Fried Foods

—Continued from page 83

quality of fat. In any continuous operation, some provision should be made for their removal, either by centrifuging or filtering.

6—Taste Changes

► Flavor of the shortening, after extensive use, is very important. Some



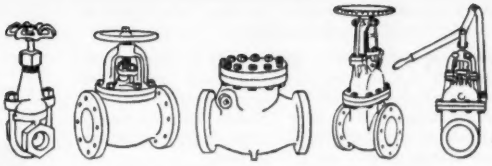
IRON

COMPLETE LINES OF IRON VALVES AND PIPE FITTINGS are manufactured by Walworth in a variety of types, pressure ratings, sizes, and patterns for general industrial use.

Walworth also manufactures complete lines of valves (including Lubricated Plug Valves), and pipe fittings made of steel, bronze, and special alloys.

These valves and pipe fittings, plus Walworth-made pipe wrenches total approximately 50,000 items and are sold through distributors in principal centers throughout the world.

Walworth engineers will be glad to help you with your problems. For further information call your local distributor, nearest Walworth sales office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, New York.



Iron valves in gate, globe, angle, check, and lubricated plug types are manufactured by Walworth. Illustrated is a sectional view of a Walworth No. 726F Standard Iron Body, Bronze Mounted, Wedge Gate Valve with flanged ends. This line of valves is available in sizes 2 to 30 inches. Similar valves of All-Iron type are also available.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

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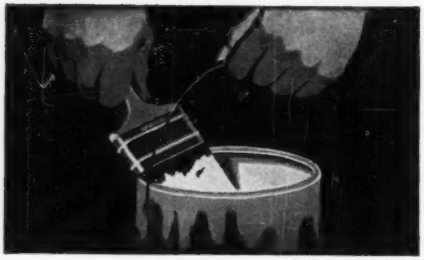
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

from paint



to potato chips!

wide-awake process men value

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Yes, in addition to its economy and efficiency, DOWTHERM® is safer!

DOWTHERM is used in an indirect system in which the fire is removed from any flammable material in process. High-temperature operations can now be accurately and safely controlled. DOWTHERM presents little hazard in handling, in shipping and storage.

Today DOWTHERM users, whether they be paint manufacturers or food processors—or engaged in any other high-temperature operation—enjoy a security unknown in earlier systems. If your operations require precise heating in the 300°-750° F. range, write to Dow for complete information about DOWTHERM.

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DOW
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INDISPENSABLE TO INDUSTRY AND AGRICULTURE

shortenings prepared from certain types of oils tend to revert—develop an undesirable flavor.

While the oil processing has a considerable effect upon flavor stability, the origin of the oil is also quite important. Some oils tend to develop off-flavors on heating or ageing, regardless of the method of processing.

Also contributing to undesirable flavor are the varied factors already considered—metallic contamination, hydrolysis, polymerization, suspended and charred food particles, and oxidative changes.

Precautionary Measures

Several general points should be mentioned, since they are definitely of importance:

Heating of fats with direct flame should be avoided, since this tends to produce localized overheating and charring. Accurate control of the temperature is therefore essential.

Under no circumstance should copper (a potent pro-oxident) or any alloys containing copper, such as brass and Monel, come in contact with the shortening.

A word about fat absorption by the finished product: Extensive tests in our research division have revealed that there is no significant differences in absorption resulting from the use of various fats. The fats tested ranged from the hardest types, such as vegetable-oil flakes and lard flakes, through the entire shortening line to salad oil (which is the most liquid).

Determining Absorption

Fat absorption is a function of viscosity, and all fats have nearly identical viscosities at elevated temperatures. The material being fried (formulation) and the frying temperature employed, determine absorption. French fried potatoes usually absorb 3 to 5 percent of the shortening; doughnuts 16 to 18 percent. Finished potato chips, contain 35 to 40 percent fat.

Further, the type of frying fat, may have some effect upon the appearance, flavor, or eating characteristics of the finished product.

References

1. *Standard Methods of Analysis*, American Oil Chemists' Society.

2. Selfenseider, *Ztg.*, 64, 122.126; *Felte U. Seifen*, 46, 628-32.

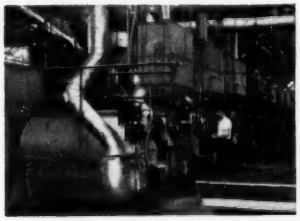
3. Pool and Ralston, *Ind. & Eng. Chem.*, 34, 1,104-05, 1942.

4. Crampton, Farmer, and Berryhill, *Jr. of Nutrition*, 43, 431, 533, and 44, 177.

General: *Oil and Fat Products*, Interscience Publishers, 2nd ed., Ed. A. E. Bailey.

End (Resume reading on page 84)

VOLUME food processing WITH GAS

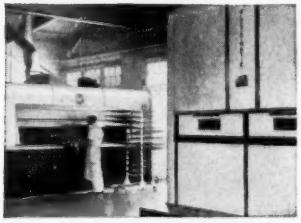


COFFEE ROASTING

Fast, uniform roasting is assured with this battery of 9 Gas-fired batch roasters, which has an annual output of 25,000,000 pounds. Gas does this job uniformly, economically and dependably.

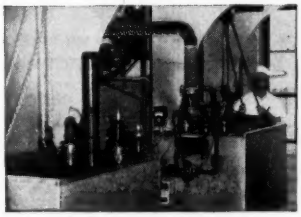
MEAT CURING

Gas burners char Hickory sawdust in this 3-story smoke house to generate aromatic smoke for curing and smoking of hams. Gas is the ideal fuel for food processing because Gas is clean, efficient, and affords precise temperature control.



VARIETY BAKING

Versatility of Gas and Modern Gas Equipment is evident in volume variety baking of rolls, breads, cakes, pies, etc. Precise, automatic temperature control for perfect baked goods is available with dependable Gas.



FOOD SPECIALTIES

These immersion tank units used for blanching nuts are typical of the Modern Gas Equipment available for special food processing. Wherever heat is needed to process foodstuffs, you will find that Gas is the dependable, clean, economical fuel to use. Get the facts about GAS today, from your Gas Company Representative.

MORE AND MORE
THE TREND IS TO GAS
FOR HEAT PROCESSING OF FOODS

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Why these foods have **PLUS VALUES...**

These great grain foods are better now. They are *enriched* to give them *vital plus values*—for nutrition, for sales! The simple process of enrichment restores most of the essential vitamin and mineral values which are unavoidably lost during milling and processing. With today's great interest in food values it is all-important to sales that enrichment is available for these foods.

If you bake white bread, or mill family white flour, or make breakfast cereals, macaroni, spaghetti, noodles or pastina, if you mill corn or white rice—you have an easy-to-use process in enrichment to make your good food better.

For detailed information about the application of vitamins to processed foods, please send your inquiry to the Vitamin Division.

ROCHE VITAMINS FOR ENRICHMENT

VITAMIN DIVISION • **HOFFMANN-LA ROCHE INC.** • NUTLEY 10, NEW JERSEY
Pacific Coast: L. H. Butcher Company, Los Angeles, San Francisco, Seattle, Portland
In Canada: Hoffmann-La Roche, Ltd. • Montreal, Que.

ADVANCES IN TECHNOLOGY

Viscosity of HTST Sterilized Evaporated Milk Can be Increased by Treatment With Enzymes

Subjecting evaporated milk to a slight and limited enzymatic proteolysis before sterilization produces a marked increase in viscosity without deleterious effects on color and flavor.

This method is applicable to both the standard and HTST processes.

Experiments were conducted with cans taken from the processing line of a commercial condensery just before sterilization. An aqueous solution of enzyme was added to the milk, then cans were inverted 10 times, sealed, incubated, and sterilized.

Concentration of enzymes needed to give optimum viscosity were (ppm.): Pepsin, 0.7-0.9; protease, 10-15; trypsin, 15-20; pancreatin, 50-75. Since these concentrations vary directly with the heat stability of the milk, different quantities are needed for different batches of milk.

Increasing stability of milk by addition of Na_2HPO_4 did not inhibit action of the enzymes, but greater amounts were required to obtain the desired increase in viscosity when Na_2HPO_4 was added.

Pilot results were confirmed by experiments in several plants. In one, the enzyme solution was added to cans before filling and the time interval between filling and sterilization was used for incubation. Results were satisfactory and similar to those obtained in the original tests.

Digest from "Effect of Incipient Enzymatic Proteolysis on the Viscosity and Heat Stability of Evaporated Milk," by N. P. Tarassuk and M. S. Nury, *Journal of Dairy Science*, 857-67, Oct. 1952.

Lindane in Cow's Milk

Like DDT, lindane is excreted in the milk of cows that are fed the insecticide.

Nine milking cows were fed dosages of 20-2,000 mg. lindane daily as a 10 percent solution in soybean oil for periods of 40-110 days. When daily doses were less than 0.36 mg. per kg. of body weight, very little lindane could be detected in the milk by chemical methods. However, with increased dosage levels progressively greater amounts were secured from the milk.

Concentration of lindane in milk dropped rapidly (at the rate of 50 percent during each 10-day period) when feeding was discontinued. None of the animals showed symptoms of physiological effects from the dosages.

Digest from "The Effect of Various Dosage Levels of Crystalline Lindane on the Concentration of Lindane in Cow's Milk," by R. E. Ely and L. A. Moore, *Journal of Dairy Science*, 733-37, Sept. 1952.

ENGINEERING

Nuts Shelled Electrically

Shells or hulls of nuts and seeds may be removed without external mechanical force by subjecting them to electrostatic or electromagnetic fields of regulated frequency and intensity. According to recent patent specifications, the operation produces heat which vaporizes moisture in the nuts causing the shell to explode, thus disengages the solid meat without breakage.

Apparatus may be constructed so that nuts flow by gravity or otherwise through the fields. Or they may be passed through a series of fields, each of which affects a different portion of the nut—inner core or outer surface of the meat. For exceptional conditions the nuts may be given a thin metallic coating to promote the effect of the field.

Digest from U. S. Patent 2,601,421 issued June 24, 1952 on an application dated June 3, 1949, to Otto Thaning, Elkenhof, Transvaal, Union of South Africa.

Solvent Extraction Feeder

A device that feeds flakes evenly to solvent extractor without undue formation of fines, and which also acts as a seal against escape of solvent vapors at the point of entry has been developed and found to operate well with flakes of cottonseed, peanuts, okra seed, and rice bran.

The unit is self-contained and portable. It consists of a hopper with a distributing screw, a main feed screw, variable speed device, and electric motor. Seal is obtained by a short tubular extension at the discharge end of the feed screw. The flaked material is compacted gently by forcing it through the extension, forming a seal against leakage of air into, or solvent vapors out of, the extractor.

The unit was designed for pilot operation, but can be readily scaled up for larger capacities. It is easily constructed and economical to operate and maintain. A single complete set of shop drawings covering the unit is available on request.

Digest from "Flake Feeding Device for Solvent Extraction of Oil-Bearing Materials," by H. K. Gardner, E. L. D'Aquin, J. S. Parker, and E. A. Gastrock, *Industrial and Engineering Chemistry*, 2261-64, Sept. 1952.

BAKING

Homogenizing the Batters Damages Cake Quality

Eating quality and acceptability of cakes made from homogenized or comminuted batters are inferior to those mixed according to established procedures. This appears to result from the lack of means to incorporate air into batters in this treatment.

Experiments were conducted with 5 different types of cakes—yellow, white, sponge layer, gold pound, and angel food. Each batter was prepared in a Hobart mixer, then divided into

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CASTERS & E-Z ROLL WHEELS

Always SWIVEL and ROLL

There is a type of Darnell Caster or Wheel for every kind of use and floor. Made for light, medium and heavy-duty service, you are sure to find in the Darnell line the exact caster or wheel to meet your individual requirements . . .

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36 North Clinton, Chicago 6, Illinois

portions, one of which was baked immediately (control). Others were homogenized at 1,000, and 3,000 lb. pressure, and comminuted.

The yellow and white layer cakes from modified batters had lower volumes, poorer grains and textures than the controls. Crumbs were tough.

Both homogenization and comminution of angel food batters resulted in extremely poor cakes. Gold pound cakes from the modified batters were all inferior to controls and cracked severely along the top surfaces. Modifies sponge batters were inferior to controls in all factors.

From the results it appears that homogenizers and comminutors might be used for yellow layer type cakes with some modifications.

Digest from "The Effect of Homogenization and Comminution on Cake Batters," by E. C. Edelmann and W. H. Cathcart, *Food Technology*, 368-71, Sept. 1952.

Tension In Stretched Dough

The "Relaxometer" is an instrument for study of relaxation time of stretched dough. A dough ball is impaled on a split pin, one half of which is fixed, and the other half movable (by a motor) to a preset distance and held while the dough relaxes. A gage measures the tension in the dough at all times and a kymograph coupled to the system traces a tension vs. time curve (relaxogram).

Curves are semi-logarithmic in form and their slope has been found to change with several experimental variables, such as rate of extension of dough, water and salt concentrations, or the presence of bromate.

There was no obvious relation between flour types and their relaxograms, and the relaxometer probably measures a class property of viscoelastic substances rather than a specific property of flour. Relaxation of gluten is like that of dough, but relaxation of starch pastes of dough-like consistency differs from that of either flour or gluten. A satisfactory theorecital basis for the relaxation curves remains to be worked out.

Digest from "Relaxation of Tension in Stretched Dough," by I. Hlynka and J. A. Anderson, *Canadian Journal of Technology*, 198-210, July-Aug. 1952.

FRUITS & VEGETABLES

Protecting Dried Fruit

In the fumigation of dried fruit in warehouses and ship holds with Etox (90 percent ethylene oxide, 10 percent carbon dioxide), extra CO_2 is sometimes added to reduce the fire hazard. A common method has been the scattering of crushed solid CO_2

(1 in. cubes or smaller) over the tops of the boxes allowing the gas to disperse through the cargo by natural evaporation and convection.

Careful sampling and analyses of the gases at different points in the stack of cases, following this method of fumigation, revealed that there was a serious segregation and layering of cold CO_2 near the floor. In these layers the concentration of ethylene oxide was lowered sufficiently to make fumigation ineffective. Circulation of gases in the chamber is required to overcome the layering.

A simple "punkah", 5 ft. 6 in. high and 2 ft. wide, swinging in a 14 ft. arc, and clearing the floor of a gangway by 4 in. was found to be most effective in circulating the air—even better than a fan installation. A symmetrical flow of gas through the stacks at about 250 cu. ft. per min. seems to be necessary for good uniformity in the fumigating mixture.

Digest from "Application of Fumigants to Ships and Warehouses. VIII. Distribution of Fumigant in Chambers Fumigated With Ethylene Oxide and Carbon Dioxide," by F. Call, *Journal of the Science of Food and Agriculture*, 212-18, May 1952.

MEATS & POULTRY

Time From Packing to Freezing Key to Cream Chicken Quality

Freezing without delay is the most important factor in preventing excessive bacterial growth in precooked frozen creamed chicken.

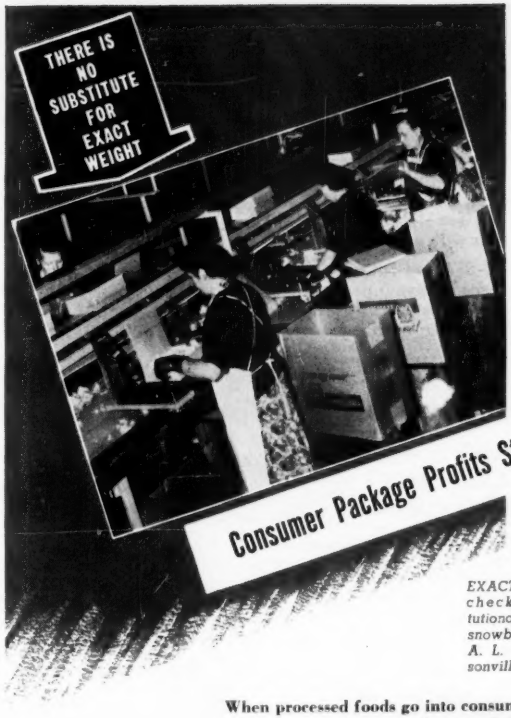
This was determined by experiments dealing specifically with effect of prefreezing delay and various defrosting times on survival and multiplication of microorganisms.

Creamed chicken was weighed into sterile cans. Then some cans were inoculated with *M. pyrogenes*. After sealing, some containers were placed in a −30 F. freezer, others were held at 77 F. for 2 hr. before freezing, still others were held 5 hr. before freezing.

Frozen samples were stored for 2 days, 2 and 4 weeks, 3, 6, and 12 months. Upon removal from freezer some were defrosted immediately by warm running water, others were held at 77 F. for 6 hr., 10-11 hr., and 18 hr. Plate counts were made as soon cans were opened.

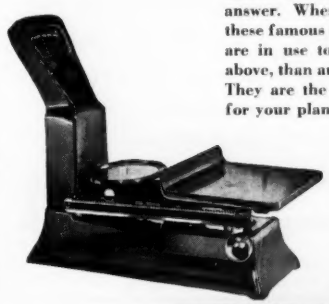
Uninoculated products frozen immediately after canning and defrosted as soon as removed from freezer showed no appreciable increase in bacterial content during 1 yr. Those defrosted in 6 hr. gave a slight increase, those in 10-11 hr. a 5-6 fold increase, and those in 18 hr. a 385-fold increase.

Samples held at 77 F. for 2 hr. before freezing showed 11-25 fold increases when defrosted immediately



EXACT WEIGHT Scales checkweighing institutional size packages of snowball cauliflower. A. L. Ruso & Co., Watsonville, Calif.

When processed foods go into consumer packages the all important question is how much is actually in the package . . . each package? Why handicap an otherwise efficient business from the very start. Remember profits start at the packaging operation. The best cost control measure is checkweighing whether the packaging is manually done, semi-automatic or fully automatic. High speed EXACT WEIGHT Scales are the answer. Wherever foods are packaged you will find these famous scales, for more EXACT WEIGHT Scales are in use today in packaging operations, like the above, than any other scales of their type in the world. They are the leaders in the field. Write for details for your plant.



EXACT WEIGHT Scale Model #213-S, the most popular consumer packaging scale—Features (1) high speed operation due to extremely short platter fall, (1/8") (2) end tower construction which takes up less bench space and permits uninterrupted production across the scale, while commodities are being weighed all in direct line of vision, 1 lb. beam, notched type Dial 1 oz. over and under x 1/4 oz. graduation—Capacity to 3 lbs.

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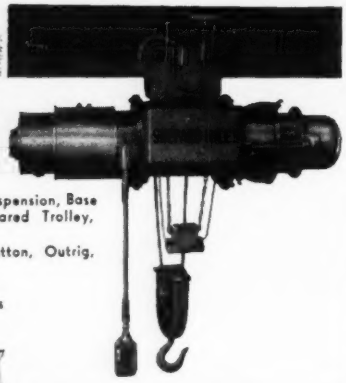

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CAPACITIES: 500 to 40,000 lbs.
SPEEDS: To meet your requirements
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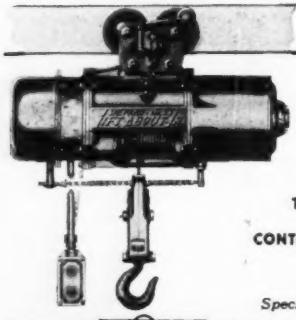

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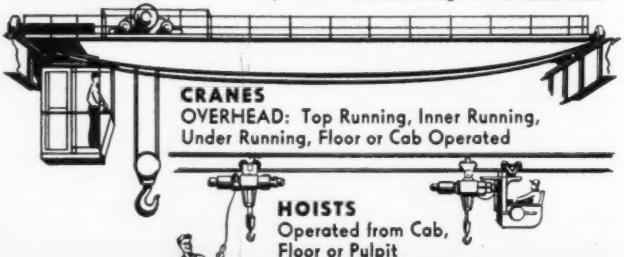

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and practically the same increase when defrosted in 6 hr. Contents of inoculated containers showed similar results (counts were very high originally, but did not increase materially during storage and defrosting.)

Digest from "Survival and Multiplication of *Micrococcus Pyrogenes* var. *Aureus* in Creamed Chicken Under Various Holding, Storage, and Defrosting Conditions," by R. P. Straka and F. M. Combes, *Food Research*, 448-55, Sept.-Oct. 1952.

Heating Shell Eggs In Oil Lengthens Storage Life

Rate of deterioration of shell eggs during storage can be greatly retarded by heating the eggs in 134 F. oil for 16 min. followed by cooling.

Thermostability and shell oiling were accomplished simultaneously in a custom-made machine by allowing a thin film of heated 50-60 viscosity oil to flow over the surface of the shells. Eggs were exposed to oil at 130, 132, 134, and 136 F. for 16 min., and at 144 F. for 8 min., then cooled in a blast of 80 F. air, cased and stored at 30 F.

After 7½ months in storage, eggs were candled to ascertain the number remaining as Grade A. Highest quality retention (85 percent) was obtained using oil at 134 F., with slightly less retentions at higher or lower temperatures. Only 37.8 percent of regular oil-treated eggs were Grade A after similar storage.

Digest from "Thermostabilization of Shell Eggs: Quality Retention in Storage," by H. E. Goresline, K. M. Hayes, and A. W. Otte, Circular N. 898, USDA, Washington, D. C., Jan. 1952.

CEREAL PRODUCTS

Presence of Flour Improvers Detected by Modified Test

In the Chopin Alveograph a disk of dough is rolled to standard thickness, then blown up like a balloon, and the time and pressure required to rupture the balloon are recorded as a curve on a revolving drum.

The curves differentiate between untreated flours from different types of wheat but do not adequately distinguish the effects of different treatments. By modifying the technique so that curves are made for the same dough 20 min. after mixing (standard method), and after 3 hr. of rest at constant temperature, effects of flour treatments are revealed.

Effect of potassium bromate was readily shown with addition of as little as 0.0002 percent, whereas the standard method alone shows no effect even up to 0.006 percent. Good correlations were also obtained between the

Alveograph curves of the modified method and treatments of flour with nitrogen trichloride, chlorine dioxide, and ascorbic acid.

Mixtures of strong and weak flours, and variations in the time before molding also gave characteristic curves. Results of the tests indicate that inhibition of proteolysis does not completely account for the effects of bromate or other oxidizing agents in dough, and a physical effect involving gluten seems to be a factor also.

Digest from "Measuring the Physical Characteristics of Flour: A Method of Using the Chopin Alveograph to Detect the Effect of Flour Improvers," by Ruth Bennett and J. B. M. Coppock, *Journal of the Science of Food and Agriculture*, Vol. 3, 297-308, July, 1952.

SANITATION

Predicting Killing Power Of Chemical Solutions

Toxicity of fumigants, insecticides, and rodenticides, may be due to physical as well as to chemical properties, and solubility of the product in some biophase of the organism receiving it can be the property responsible for its toxicity. The susceptible biophase seems to be the same or very similar in all organisms.

Toxicity of many gases and vapors can be predicted by this principle, and a linear relation exists between the logarithm of the toxic concentration in the biophase and the molecular volume of the toxic compound. When this principle is applied to compounds of known toxicity to various species, the linear relationship holds sufficiently close to distinguish compounds of physical toxicity from those suspected of being chemically toxic.

Homologous groups in compounds have an additive effect so that physical toxicity can be calculated for many compounds. Calculated bactericidal concentration of a series of compounds showed excellent agreement with actual toxic concentration against *Staphylococcus aureus*.

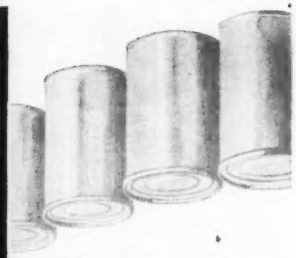
Digest from "The Physical Toxicity of Chemicals. II. Factors Affecting Physical Toxicity in Aqueous Solutions," by J. C. McGowan, *Journal of Applied Chemistry*, Vol. 2, No. 6, 323-28, June, 1952.

Break-Point Chlorination

Chlorine reacts with nitrogenous impurities in water supplies to form mono-, di-, and trichloramines.

As the chlorine additions are increased the chloramines are oxidized to nitrogen and hydrochloric acid. The free or residual chlorine vs. added chlorine curve, therefore, shows a peak followed by a drop as the chloramines are oxidized, and then another

cut costs with Angelus Seamers



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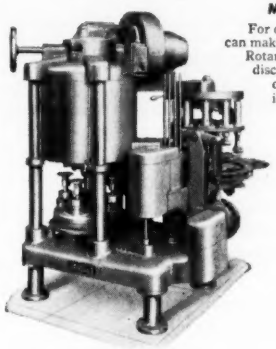

Model 40P-DF
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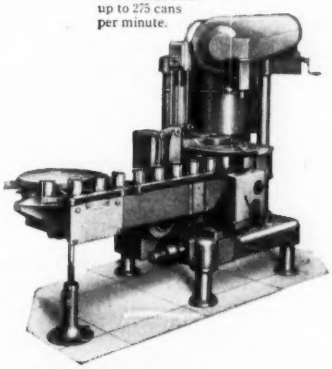

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Some processing units are harder to clean than others. A pasteurizer, for instance, has many corners and crevices that are difficult to get at. These out-of-the-way places make ideal breeding grounds for product-spoiling bacteria.

Many large producers are successfully solving this ticklish sanitation problem by spray method chemical sterilization. Equipment used is the portable Oakite Sprayer, Model 374. Germicidal agent is Oakite Sanitizer No. 1 (used at ½ fluid oz. per gallon of water.) Procedure: A few strokes of the sprayer's plunger develops ample air pressure for fast application of germicidal solution.

For complete details drop a line to Oakite Products, Inc., 26G Rector Street, New York 6, New York. Or consult your local Oakite Technical Service Representative.

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rise as more chlorine is added to the water whose impurities have been completely oxidized.

This is the principle of "break-point" chlorination. It is effective in removing odors and tastes from waters high in organic matter though it must be carefully controlled when it is used to treat drinking water.

Industrial water, especially cooling and condenser waters, can be kept free of bacterial slimes by this type of chlorination, using 5-10 ppm. of added chlorine or even more. Cooling tower growths can be kept under control also, but the biological oxidation of organic matter in a cooling tower is cheaper than its oxidation by added chlorine. Control efforts should therefore be limited to keeping the growth from being too luxuriant. Marine growths, such as mussels, that sometimes block salt-water culverts can also be kept within bounds by chlorinating the water flowing through the culvert.

Digest from "Recent Developments in the Chlorination of Water," by H. Pirie, *Chemistry and Industry*, 459-62, May 24, 1952.

MISCELLANEOUS

Vegetable Fat Cheese

A product which is claimed to simulate butterfat-containing cheese in taste and texture, yet has no milk fat is the object of a recently patented process.

In the process, skim milk is heated to 160-170 F., cooled to 80-90 and converted to a non-fat cheese by conventional methods. Following pressing for about 14 hr. cheese is aged for at least 6 weeks at low temperature, then shredded and melted by heating to 150-180 F. In the molten state are incorporated 2-3 percent emulsifying agent containing vitamins A and D, and sufficient edible oil to give a finished product with 24 percent fat. Fluid is poured into molds to harden.

Digest from U. S. Patent 2,604,405, issued July 22, 1952, on an application dated Jan. 6, 1950, to H. J. Petersen, Tonica, Ill.

Fermentation of Yeasts

Yeast flocculation is a normal phenomenon in brewery fermentation and those not exhibiting this property are considered undesirable. Beers that clarify too rapidly, usually ferment vigorously at the start, then settle the yeast early, and do not attenuate the wort completely.

By following turbidity of the wort as well as decrease in extract, effects of fermentation variables on flocculation have been studied. With a normal flocculating yeast turbidity in-

Food Engineering Reports
LATEST TECHNICAL NEWS
In Keeping Up With Field . . . page 185

creases up to the 4th day, then decreases about as rapidly.

Powdery yeasts show a slower rate of turbidity rise and do not settle out when fermentation tapers off. Old yeasts (13th generation) tend to settle out sooner than younger yeasts (first generation) and regenerating, by allowing them to ferment 10 percent sugar solutions, does not increase the time before flocculation and settlement occur.

Size of inoculum has no appreciable effect. Fermentations carried out at 7.5-10.7 C. showed flocculation on the 4th day. A parallel fermentation at 5-8 deg. did not flocculate till the 8th day. Within the normal limits of a brewing fermentation, flocculation is not affected by the pH (4.0-5.2).

The race of yeast, the amount pitched, and the temperature at which the fermentation is controlled, are the essential factors in controlling flocculation in the brewery yeasts.

Digest from "Curves of Fermentation and Flocculation of Yeast," by J. DeClerck and G. Van Roey, *Bulletin del Association des Anciens Etudiants en Brasserie de l' Universite de Louvain*, Vol. 48, No. 1, 5-11, 1952.

New Statistical Techniques For Organoleptic Tests

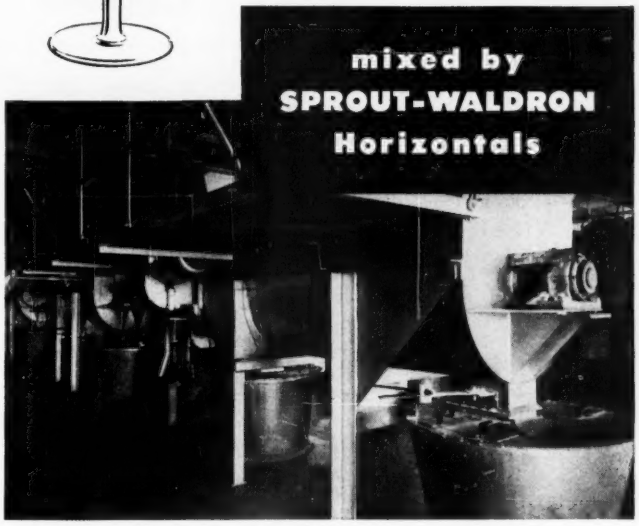
A new method of statistical analysis of data from experiments involving organoleptic testing has been proposed for paired comparisons. It has the advantage of being exact for small samples, requiring only simple computations and relatively small numbers of observations.

The design is easily understood by the layman, and the analysis requires no specialized statistical training. The procedure has been applied in such varied experiments as: (1) testing for differences in cooked fresh pork and cured hams due to effects of diet; (2) detection of benzene hexachloride and other insecticides in peanut butter; (3) detection of color differences due to hormone spray treatments in varieties of applies, and (4) testing for effect of monosodium glutamate in applesauce and dehydrated apples.

The new method is illustrated in a hypothetical example, for which step-by-step procedure is laid down.

Digest from "Ne Designs and Techniques for Organoleptic Testing," by M. E. Terry, R. A. Bradley, and L. L. Davis, *Food Technology*, Vol. 6, 250-54, July, 1952.

"MY-T-FINE"
powdered desserts...



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It's here that the nationally advertised MY-T-FINE powdered puddings are mixed . . . "untouched by human hands." The complete process is entirely automatic!

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The "mix" consisting of sugar, flavoring and other dry ingredients, must be absolutely correct . . . "ok" by laboratory test and by taste. Mixing time for each 5000 lb. batch averages 50 minutes, after which product is discharged to packaging bins on floor below. The spotless Penick & Ford Laboratory-Kitchen assures quality control from start to finish.

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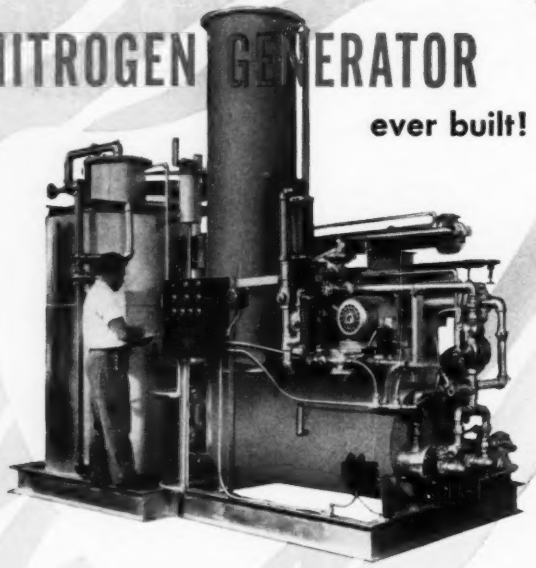

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equipment for producing industrial gases

New Continuous Plant

—*Continued from page 81*

that portions of them are below this platform. And suspended below the platform are easy-to-get-at sanitary pumps, pipes, and fittings.

All openings on the platform are booted to facilitate clean-up operations and to prevent water from flowing onto the floor below.

In making noodles, defrosted eggs are first dumped from 30-lb. tins into a knee-high mixing tank having a double-blade, vertical-type agitator. Water is then metered into the tank and mixed with the eggs. The egg solution—enough for over an hour's run—is next pumped through a stainless bucket-type screen strainer and into a holding tank, which is also equipped with an agitator. While egg solution is fed to the dough-sheet former from the holding tank, more is prepared in the mixer.

Automatic Feed

Feeding durum flour and egg solution to the sheet former is automatic. Flour comes from a company-designed feeder-type valve in thin-ribbon form and goes onto a short belt. A graduated dial is set for the amount of flour to be fed to the belt. Egg solution is metered and distributed onto the ribbon of flour for quick absorption of the required amount of egg solids.

Ingredients are now charged into the mixing chamber, where a horizontal shaft with paddles mixes the dough to uniform texture, consistency, and color—all with minimum supervision. The dough is then forced into a pair of rolls and delivered in a thick sheet to a reciprocating device, which folds the sheet as it falls to a belt below. A second pair of rolls, mounted at right angles to the first pair, reduces the thickness of the sheet. Then a second criss-crossing device again folds the sheet, which is now fed to a third pair of rolls, also at right angles to the second pair. Finally, the sheet is automatically wound on a spool at a rate running 1,600 lb. per hour.

At this point, the dough is ready to go either to the noodle slitter or to the folding machine. When fed to this company-built slitter, the spool of dough passes through a pair of cutting rolls. Here, the sheet is reduced to the required thickness and slit into ribbons, varying from fine to wide. A rotating knife then snips the ribbons to uniform lengths.

Noodles are now pneumatically conveyed to a hopper. A flight convevor carries them to an oscillating belt that

uniformly distributes them on a wire-mesh conveyor traveling through a continuous two-stage dryer. Noodles make five passes through the first stage and seven through the second stage. Drying takes 3-5 hr., depending upon the product. Conveyor speed is carefully controlled here by use of a tachometer.

If noodles are to be folded, a company-designed machine is employed. Each ⅛-in. thick spool of dough is loaded onto this noodle-folding unit. The dough then travels through two pairs of rolls that reduces its thickness to 1/32 in. A set of slitting rolls now cuts the sheet into ribbons, which are snipped by a rotating knife to the desired length. Finally, a rotating bar folds the noodles in half and deposits them on a flat metal tray, which then goes into a dryer.

Multiple Packaging Methods

Long goods are packaged in window type cartons and specially designed cellophane-overwrapped trays—both in semi-automatic operations.

Cartoning is performed in this manner: A team of girls, flanking a canvas-belt conveyor, weighs the macaroni or spaghetti and inserts it into 1-lb. cartons. These are then fed to a Ceco machine that automatically glues and seals the flaps.

Cellophane-wrapped goods are handled on a company-designed line. Here, three girls weigh the macaroni in 1-lb. portions and place them on a canvas-belt conveyor. Next, the macaroni goes to a packaging machine, where it is fed onto trays and overwrapped with heat-sealable cellophane. A special film is employed with 3-in. strips of colored cellophane laminated to the ends.

This type of wrap was designed to prevent package damage by the sharp ends of the product. Ends of the package are protected by the tray and the laminated film.

Short goods and noodles are packaged by two machines (a Triangle two-spout Elec-Tri-Pak and a Wright Hy-Tra-Lec).

End (Resume reading on page 82)

Six Engineering Advances

—*Continued from page 71*

Another employee safety and comfort feature is the use of aluminum-grating platforms at the discharge end of the pasteurizers and the labelers to provide proper working heights. Aluminum ship ladders equipped with carborundum inserts to prevent slip-

Every Second...

your competitor who wraps with this machine, betters your packaging production

Two to One!

The perfect wrapper for:-

- CANDIES AND CONFECTIONS
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- PREPACKAGED MEATS
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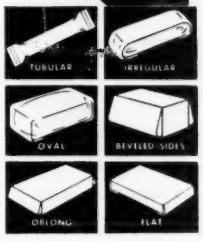
- ICE CREAM BARS AND 101 OTHER VARIED ITEMS



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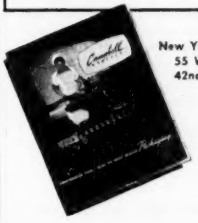
With the continuous feed Campbell Wrapper you effectively meet competition by *raising output — cutting unit costs!* Packaging from 150 to 300 single or multiple units per minute is every day operation with this modern machine, and, with only one person to feed and operate machine. "Float" wrapping does away with costly breakage, too — regardless of how oddly your product is shaped, how solid or fragile its make-up. Wraps with materials of all types, perfectly positions imprinted labels and package seals most any way desired — including hermetical sealing with or without tear strips. Only competition *using the same machine* can match your packaging production when you use the Campbell Wrapper. Send us a sample of your product for further details.

We are contributing to the nation's defense program by providing a large part of our increased production facilities for building precision armaments.



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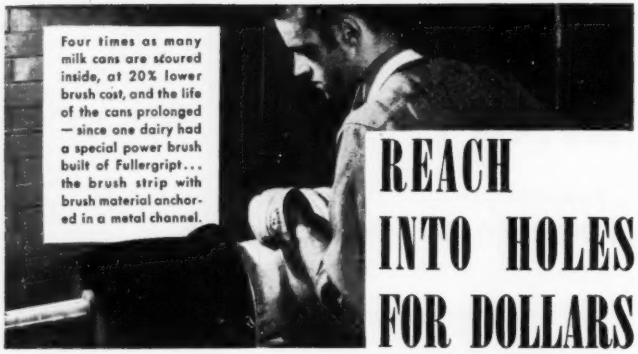

Four times as many milk cans are scoured inside, at 20% lower brush cost, and the life of the cans prolonged — since one dairy had a special power brush built of Fullergript... the brush strip with brush material anchored in a metal channel.

REACH INTO HOLES FOR DOLLARS

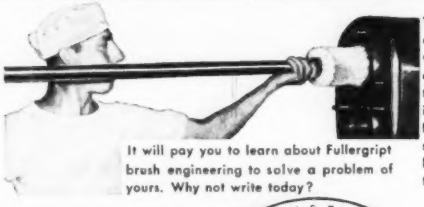
ROUND OR SQUARE TUBES, PIPE AND CHUTES CLEANED AT LOWER COST WITH *Fullergript*

Brush life is doubled for dairies that clean tubes with this special Fullergript power brush, which can be reversed on the core for extra life. Another saving: only the coiled brush strip is replaced; the husky brass core is permanent.

For power plant operators these condensor tube cleaning brushes are built with coiled Fullergript strip. The type shown above at the right uses protective rubber bumpers which also serve as pistons when compressed air is applied to the tubes. For a lower cost brush many power plants use the type at the lower right, which is formed around a wood dowel.

This square brush rides the chain in a flour elevator leg, to reach into corners, and remove weevil-breeding flour accumulations. A good example of Fullergript design versatility.

This special, refillable brush is built flexible, to bring Fullergript's multiplied cleaning action inside of beer lines.



This special brush for the freezing cylinders of ice cream machines will last eighteen months (instead of one month) but more important, it assures positive removal of incipient casein deposits — in just five to ten strokes. Fullergript strip, with channel-anchored brush material, makes possible this augmented scouring action.

It will pay you to learn about Fullergript brush engineering to solve a problem of yours. Why not write today?

INDUSTRIAL Fuller BRUSH CO. DIVISION

3640 MAIN STREET HARTFORD 2, CONN.

Wet and Dry Mops, Brooms, Waxes and Polishes, Floor and Special Brushes

ping are installed between the floor and platforms at the labelers.

Natural lighting in the room is augmented by 116, 40 w. and 96, 100 w. two-tube, industrial type fluorescent fixtures. Level of illumination is maintained at 25 foot-candles, with higher levels in critical areas and still additional lighting provided under the washer hoods and pasteurizers.

Debris Trapped

All floor drains in the bottling room are piped to glass separators or traps located in the basement. These separators, of which there are four (one for each two bottling lines) are steel tanks, 4 ft. dia., by 7 ft. high with 6 in. inlet and outlet connections in the shell near the top. Thus all broken glass and other foreign materials are trapped and prevented from clogging the underground sewers. Gasketed access manholes can be opened periodically after draining off any trapped liquid, and the solids placed in drums for removal from the plant.

Re-use of heated air to condition the basement, also the method of heating and ventilating the bottling room, further exemplify the advanced engineering employed. The method was proposed by the owner, Mr. Stroh, and developed by the engineers.

The room has an area of approximately 30,000 sq. ft. and a volume of close to 850,000 cu. ft. It was deemed advisable to introduce some outside air to reduce the relative humidity and to freshen the room air.

Range of Aeration

Thus, four vertical unit heaters were placed on the balcony along the north wall, where outside air connections to the units could be readily made. The recirculating connection is taken through grilles on the underside of the balcony. These incoming units each handle approximately 11,000 cfm., discharging across the room with sufficient velocity to reach the opposite walls. And return air is pulled back toward the units by the recirculating connections.

Air temperature is automatically controlled by thermostats, and the proportion of outside and recirculated air is controlled manually by duct dampers. Steel convector type radiators are located under windows to complement the unit heaters in maintaining satisfactory temperatures.

The portion of the basement containing the feed legs for the bottle soakers, case conveyors, and auxiliary mechanical equipment is separated from the empty case storage room by walls pierced by several doors and conveyor openings. These two areas re-

quire year-around ventilation and winter heating. Combined area of the two is about 50,000 sq. ft., and the volume 650,000 cu. ft.

To heat and ventilate these areas, air from the bottling room, constantly freshed with outside air, is drawn from near the roof line where it is warmest. Copper ducts conveying this air to the basement are also extended through the roof. Thus all air needed in the basement can be taken from the bottling room, or in the summer season from outdoors, and in any proportion as required from either.

Four unit fans with a total capacity of 30,000 cfm. distribute this air to the basement areas. About half the air goes to the soaker feed room, and this air is exhausted to the outdoors by several fans that are suitably placed close to the soaker legs and thus pick up and remove the usual odors.

No exhaust fans are installed for the air introduced to the empty storage area. They are omitted intentionally, purpose being to build a slight pressure in this area tending to keep outside air from entering around door and window construction or conveyor openings.

This arrangement provides appreciable savings in heat requirements, while preventing odors from around the soaker feed area from spreading throughout the building.

Installation of these soaker legs in the basement frees the bottling floor of the accompanying debris and localizes this operation in a separate area, simplifying maintenance and greatly improving plant sanitation.

System Spots Failures

Other special devices complement the productive units. There is a signal system for spot location of machine failure or breakdown. Here, electric interlocks are provided between the several elements of the bottling lines to prevent bottle jams in case of stoppage of any component machine. Similar interlocks are used on the carton conveyor system. A monorail with a 4-ton trolley and chain fall runs the entire length of the bottling floor over the fillers.

Safety in handling caustic soda is provided by installation of a specially ventilated mixing tank and use of a hoist for raising the soda drums. A skip hoist is also used for elevating broken glass from the several floors to the glass storage hopper.

A sanitary lunchroom adjoining the employees' locker rooms is only one of the many modern facilities incorporated to make for the best of working conditions.

End (Resume reading on page 72)

(Advertisement)

With This NEW Improvement Niagara "No-Frost Method" puts you a big step ahead in trouble-free, automatic refrigeration or freezing

Niagara "No-Frost Method" keeps frost and ice COMPLETELY OUT of your cooling, chilling, freezing or cold storage.

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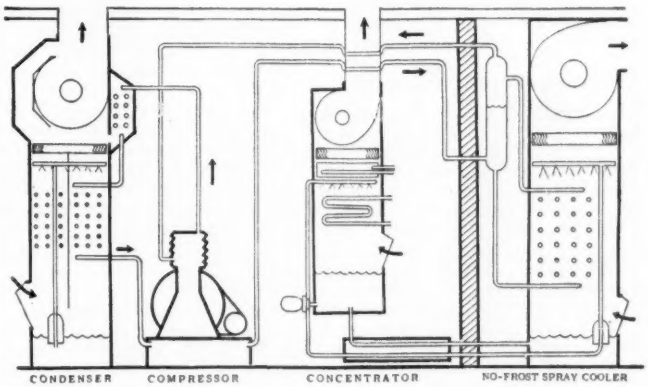
For complete information write to the Niagara Blower Company, Dept. FI 405 Lexington Avenue, New York 17, New York.



A simple method, easily maintained. Saves a third of your refrigeration cost. Ask for Niagara Bulletins 118 and 119.

Questions & Answers

THIS MONTH'S PROBLEM

Question—We have a customer favoring a dark-brown bean color for pork and beans in tomato sauce. Satisfactory results—a product with a baked bean appearance—were obtained when the beans were processed in No. 2½ and 10 cans, but not in the No. 1 (300x407) container. In the No. 10 cans, where the desired bean darkening occurred, we added 50 oz. of soaked, blanched beans; 1 oz. of pork; and sauce to give a 6 lb. 14 oz. net weight. Beans were blanched 3 min. at 200 deg. F. Sauce contained salt, sugar, seasoning, water, and tomato puree. These cans were then heat-processed 3½ hr. at 245 deg. F., and cooled for 1 hr. Darkening in the No. 10 tins occurred immediately after retorting. Our experimental work with the No. 1 can pack involved various fills with soaked, blanched beans; increases in retort temperatures and cooking times; use of beans in different stages of process (dry, soaked, blanched, or unblanched); changes in the type of tin-plate (plain or enameled); and differences in blanching times as well as can-closing temperatures. Processing times and temperatures employed for the No. 1 cans were 70 min. at 245 deg. F., 60 min. at 250 and 255 deg. F., and 70 min. at 255 deg. F. Closing temperatures ran between 160 to 200 deg. F. Blanching times were 3, 5, 10, and 15 min. at 200 deg. F., with and without cold-water rinses. Still, we were unable to come up with desired bean darkening. Have you any suggestions on what can be done to obtain the desired dark-brown bean color in our No. 1 can pack?

Answer to October Problem

The Question Was—We have an annual problem at the start of each tomato season. After the first day's run on tomato catsup, part of the pack must be set aside because of the objectionable metallic flavor pick-up from the lines. Our cooking kettles and holding tanks are of stainless steel. But from here on, there are brass filler bowls and copper pipes and fixtures. In the past, we have tried to eliminate this condition by running hot caustic, water, or vinegar through the system. We even allowed the vinegar to stand overnight. However, the end result is invariably the same—the tomato product does the metal cleaning. Consequently, we must discard some of our product each season. The reaction for corrosion is: $2Cu + O_2 + H_2O$ yields $Cu_2CO_3(OH)_2$. Now, should we remove this product of corrosion? Or should this problem be attacked from another angle?

Answer—Probably the reason your efforts to remove corrosion products from the brass and copper portions of your catsup equipment have been unsuccessful is that the agents you have tried for flushing the lines do not duplicate the corrosive action of the product. For example, tomatoes contain mostly citric acid, with a little malic acid and a very small amount of succinic acid. Use of vinegar or hot caustic would scarcely have the same effect upon the metals, and their corrosion products.

You might try heavily tinning all brass and copper parts in contact with catsup, provided their construction and operation would permit this practice. The tin would be attacked by the product, but its effect upon color and flavor would not be detrimental. And, of course, these parts must be retinned, if necessary.

However, it is our recommendation that the brass and copper parts be replaced with more corrosive-resistant materials. In this way, subsequent metal pick-ups would be prevented.

Accepted present-day practice in the tomato-products field calls for the use of stainless steel, nickel, or glass-lined equipment. And, since you already have a good start on such an equipment line-up, you can carry through the remainder of the lines on a planned schedule basis.

Presumably, this will include pipelines, fittings, valves, and filler parts—all of which can be installed in a fairly short time and without serious interruption to your production.

With so many other quality factors to control, we believe that investment in suitable corrosion-resisting equipment will prove worthwhile. For such equipment will safeguard your production from off-colors and off-flavors due to metallic contamination.—*The Editors.*

More on Corrosion

Metallic flavor pick-up would probably be negligible if the cooking kettles and holding tanks were constructed of copper, and the filler bowls, pipes, and fittings were of stainless steel. Reason: Copper pick-up is more rapid and extensive at comparatively lower than higher temperatures.

If it is necessary to use different metals in the system, it would be advisable to employ those which would not cause undesirable flavor reactions. Therefore, it might be desirable to put aluminum rods inside copper pipes and, perhaps, even a few pieces of aluminum foil in filler bowls. As a result, differences in electrode potentials of aluminum and copper and aluminum and stainless steel will be great enough to result in a preference to aluminum pick-up. This pick-up will not adversely affect food flavors.

This idea—electro-motive potential differences—has been employed to avoid flavor defects in milk products, which are extremely sensitive to metal contamination.—*Milton E. Parker, Director and Professor, Food Engineering, Illinois Institute of Technology, Chicago.*

Still More on Corrosion

Since tomatoes contain citric, acetic, formic, lactic, malic, and transaconitic acids, it is possible that a solution containing a mixture of these organic acids is required to scavenge the copper carbonate "rust" in the lines.

Cane molasses may contain acetic, formic, lactic, and other acid salts, derived from invert-sugar decomposition There may also be some aconitic acid salts.

Therefore, if blackstrap cane molasses were acidified with sulphuric acid to the same pH as tomato catsup, it would probably have a similar copper cleaning property. In some cases, hot, acidified cane molasses keeps copper clean.—*M. H. Sherrill, Danville, Calif.*

Wants to Make Crumpets

Question—I would greatly appreciate details on the manufacture of English crumpets, specifically a formula and directions for processing.

Answer—Here's a good formula: Water (about 90 deg. F.), 8 lb.; bread flour, 7 lb.; cake flour, 2 lb.; yeast, 4 oz.; salt, 3½ oz.; and sugar, 1 oz.

Procedure: Dissolve the yeast in part of the water. Next, introduce the remaining liquid into a vertical type mixer or beater. Now add the yeast solution along with sugar, salt, and flours, and mix to a batter consistency. Work the batter in the mixer for about 10 min. in order to develop the gluten. The tougher the batter, the better the crumpets. Temperature of the batter at this point should be 80 deg. F.

Proof the batter in a warm, humid cabinet for about 90 min., or until the batter shows signs of receding or

dropping. Mix the batter for about 1 min., next allow to raise for about 15 min.—and then it is ready for baking. If it is not possible to bake immediately, add and mix into the batter ¼ oz. of baking soda dissolved in 8 oz. of water.

Bake in very slightly greased muffin hoops placed on a sparingly greased hot plate. The batter must be ladled into the muffin hoops.

If the crumpets do not "hole" sufficiently (a sponge-like, vesiculated surface appearance), then the batter is either too stiff or the hot plate is not warm enough. Add more water if the batter is too stiff, making sure you beat it in well.

Invariably, the first lot of crumpets baked after greasing the hoops are a bit below par, and the second and third lots are better.

The hot plate should be at a slightly higher temperature than that used when baking muffins.

Keeping Piped Product Fluid

Question—Have you any suggestions on how we can install a pipe line to handle one of our products so that it can be easily and quickly disassembled for cleaning? Our product melts at 100 deg. F., and it must, therefore, be heated as it flows through the pipes to remain fluid.

Answer—Heating of pipe lines by means of a steam or hot-water jacket, or even by a small tracer line, is common practice. However, these conventional methods must be ruled out since such pipe lines cannot be easily disassembled. Under the circumstances, heating the pipe line electrically may be more suitable and convenient.

Here's a neat and efficient arrangement: Install "dairy" or sanitary-type tubing and fittings for your pipe line.

How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to questions in this department, especially to "This Month's Problem." Selected answers will be published with credit (unless you specify otherwise). We pay space rates.

What is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

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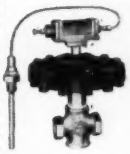

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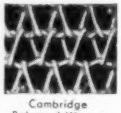
For example, this photo shows a specially designed Cambridge belt carrying asparagus spears from a wash tank prior to freezing. Other belts may be used on inspection tables, in blanchers, on packaging and labeling machines, in freezer tunnels.

The moving belt eliminates manual handling, helps maintain product uniformity. All-metal construction gives longer belt life and lower maintenance costs. Open mesh of the belt provides free drainage of wash waters as well as free circulation of air in the freezing tunnel. Special side or surface attachments are available to meet individual requirements.

Cambridge belts can be woven to any mesh or weave, from any metal or alloy, including stainless steel. Next time you have a conveyor belt problem, call in your Cambridge field engineer for his experienced advice. Write direct or look under "Belting-Mechanical" in your classified telephone directory.



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Such a line can be easily and rapidly disassembled for efficient cleaning. Then heat the entire assembly by continuously passing through it a low-voltage, high-amperage current.

This calls for a special transformer, suitable current-carrying clamps, and insulating members. There are firms specializing in the design and construction of such electrical equipment. It is necessary, however, to furnish them your product temperature and flow, specific heat requirements, and a complete diagram of your pipe line.

The low voltage employed eliminates any hazard to personnel, while the heat is applied directly where needed to minimize power requirements.

If there is any chance of changing, from time to time, the layout of your pipe line, we suggest using a simpler, yet more flexible method. Merely wrap flexible, cable-type heaters around the pipe line. By using a separate cable for each main pipe section, the entire line can easily be disassembled by simply unplugging each heating cable from its electrical outlet.

Before employing either type of electrical installation, learn the nature of your local codes for such specialized equipment.

Re Sanitary Equipment

Question—We have lately heard a great many manufacturers of food processing equipment extoll the merits of their units from a sanitary standpoint. Would you please advise us what is involved in the sanitary construction of equipment?

Answer—Today, emphasis is indeed being made on sanitary features of equipment construction—and rightfully so. Much has been written on the subject, and, of course, a detailed discussion is limited in this section. However, the basic principles can be easily reviewed, and they should be familiar to those purchasing or operating food-processing equipment.

Here, briefly, are the sanitary features involved in the construction of food-plant equipment:

1. Equipment surfaces should be smooth.

2. Non-corrodible materials such as stainless steel, monel metal, glass and the like should be employed.

3. Materials should be impervious. Metal piston rings and liquid seals should be used in place of leather rings and packing glands.

4. Equipment must be readily accessible for cleaning. Units must be easily dismantled with the simplest tools.

5. Inside corners should be rounded and not square. Outside rounded supports should be used in place of flat ones, since they hold less dirt.

6. Units should be free from dead areas and internal threads.

7. Equipment should be designed to keep dirt and lubricants from product.

8. Toxic metals such as lead, antimony, or cadmium should not come in contact with food products.

9. There should be no submerged product inlets or direct sewer connections.

10. Bearings should not be submerged in food products, unless constructed for easy and complete disassembling during cleaning.

11. Machine bases should be constructed to permit easy access for cleaning. Or, the machine should be completely sealed to the floor.

Excellent work in establishing sanitary standards in the design of food-plant equipment has been carried out by such agencies as the Dairy Industries Council. Their published standards for pumps, tanks, and other equipment can be profitably studied by other branches of the food industry.

You might consult the book, *Sanitation for the Food-Preservation Industries* (McGraw-Hill Book Co., Inc., N.Y.C.), prepared by The Association of Food Industry Sanitarians, Inc., in cooperation with The National Canners Association.

Handling Preserves

Question—We are working out plans for a vacuum-pan installation for cooking fruit preserves. However, we are now faced with a problem: How to transfer the finished batch from pan to holding tank. Our plant layout does not permit gravity discharge, and we are anxious to avoid any disintegration of whole fruit likely to result from pumping the product at this stage. Have you any suggestions to offer?

Answer—Use of a slow-speed, positive-displacement type sanitary pump will keep mechanical damage to fruit at a minimum. However, there are several installations now operating very successfully in which the product is transferred (undamaged) without pumping. Instead, air pressure is employed.

Since you are still in the planning stage, it should be very easy for you to specify to the equipment manufacturer that the new vacuum pan should be equipped for compressed air discharge. A shut-off valve will then be furnished for the vapor pipe as well as a suitable connection for the compressed air line. Of course, a safety pop-off valve is necessary to safeguard the unit against excessive pressure.

The compressed air line should be fitted with a suitable pressure-reducing valve and a separator-strainer for preventing entry of entrained oil or dirt into the vacuum pan. Some preserve manufacturers even employ an absorbing unit of the activated carbon type to protect their preserves against foreign odors and tastes.

Providing you have a supply of compressed air available, this method of product discharge not only protects the fruit from damage, but it also eliminates investing in a pump as well as cleaning and maintaining it.

Considering Palletizing

Question—We manufacture a wide variety of processed foods and grocery products in a multi-story factory. Most of our finished stock is handled on hand trucks. We are now interested in carrying out a preliminary investigation on the possible benefits of palletizing our stock. Can you offer some suggestions on how to proceed and what to look out for in considering this method of handling?

Answer—We assume that you already have accurate cost figures on the present handling method for comparison with estimated costs for pallet-fork truck handling. We also assume that you have tonnage figures for all your products by sizes for peak production periods.

Therefore, one of the first steps is to decide upon a suitable size pallet to accommodate your packages with minimum waste space. A good starting point is the U. S. Bureau of Standards' recommendations for pallet sizes —32x40 in. and 40x80 in. The latter is the more popular size.

By laying out your own carton dimensions to scale on a drawing or by arranging full size cartons on a measured, marked rectangle on the floor, you can soon satisfy yourself on optimum dimensions for pallets. Then this pallet dimension, plus an allowance for load overhang (some plants use 2-3 in.), must be checked against the column spacings and the size of the elevators to be certain that pallet-loads will fit satisfactorily. Some compromise with the optimum dimensions of the pallet may be necessary to obtain maximum benefit from your existing storage and elevator facilities.

Having selected a tentative pallet size and knowing how many layers of cases can be conveniently stacked on one load, you can next compute the total weight per pallet-load of each product. The heaviest load will dictate the size of fork-lift truck required. This weight data, together with tonnage figures, will also enable you, by a process of division, to estimate the number of pallet loads to be handled. When you apply your turn-over ratio for each product, you will arrive at the actual number of pallets that must be purchased.

Fork-lift truck capacity is expressed in pounds at specified load-center distances. If, for example, it is found that a 40x48-in. pallet can be used and that the estimated loads range from 1,500-3,000 lb., then you must employ a load-center distance of one-half of 48 in. Such a truck rated at 3,000 lb. on a 24-in. center will handle your heaviest or two of your lightest loads.

Now you will want to decide tentatively between gas or electric trucks. The former are usually indicated if much of the transporting is out-of-doors or up steep ramps. On the other hand, the latter are preferred in enclosed areas such as the upper floors of the building.

Probable number of fork-lift trucks required will depend upon the number of loads and the distances that they must be hauled. Distances will be determined by the plant layout. From the specifications of a truck, you can learn its speed. And from this speed, you can calculate the number of loads a truck can move the required distance per shift.

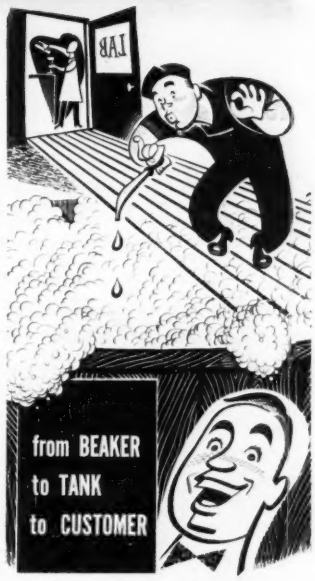
It is best to use fork-lift trucks for stacking and long-distance hauling and to plan on less expensive non-stacking pallet-movers for such short hauls as on and off elevators.

When you arrive at tentative decisions on size and number of pallets and trucks, then estimate the investment required and the probable savings and return expected from this investment. Should the figures be attractive and a decision be made to consider the change-over more seriously, here are additional points that must not be overlooked:

1. Very important, indeed, is checking your floor-load capacity to make certain the floor will hold the tiers of palletized merchandise and the weight of the loaded truck that will enter the storage area to add or remove loads. Safest procedure is to employ an architect to check the building plans. A beam-and-girder type structure will behave differently from, say, a reinforced concrete-slab structure. And a wooden structure may be entirely unsuited to the type of loads that may be encountered.

2. The same goes for checking the capacity of the elevators. Fork-trucks are quite heavy, and they may not enter loaded elevators safely.

3. Overhead clearances of doors, pipelines, and conveyors must also be checked along all routes taken by the trucks. Plus, the truck-mast height (in lowered position) can be properly specified and overhead hazards can be



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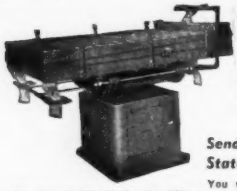

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If this all seems complicated, consider the substantial savings likely to be obtained for the effort involved. And do not overlook the valuable assistance that manufacturers of materials-handling equipment are able to furnish you. What is a new and complex problem to you is but a variation of a thoroughly familiar job to them.

Cold Sterilization Query

Question—What is cold sterilization? Is this technique being employed commercially to sterilize food products?

Answer—Common method of sterilization is heating products to sufficiently high temperature and for a long enough period to kill microorganisms or their spores. For foods packed in hermetically sealed containers, it is the most practical and least costly technique.

Freezing and holding packaged foods at zero or sub-zero temperatures is another method of preservation, but not necessarily one of sterilization. However, once product is defrosted and held in this manner for any length of time, spoilage will, of course, take place.

Cold sterilization, on the other hand, does not involve heating or freezing. It can be achieved by bombarding products with high speed electrons emitted from certain equipment developed for cathode-ray sterilization or by exposing foods to rays from radio-active substances.

At present, bombardment with electrons is far too costly for most purposes and limited in application. Tests have shown that cathode rays destroy bacteria and not enzymes. Also, the rays produce off-flavors in certain foods.

As for exposing foods to radio-active materials, this method is also in the experimental stage. Considerable study on the possibility of this method of sterilization is underway. The American Meat Institute Foundation, for example, is investigating use of radio-active fission byproducts for cold sterilizing meats and meat products. Under study are effects of irradiation on bacteria, enzymes, and pigmentation of meats.

The addition of antibiotics to canned foods is being investigated for the purpose of reducing severity of heat processing. And atomic radiation is also being considered.

There's one right down your alley!

There are International Trucks with a wide variety of specialized bodies to meet every requirement of the food industry.

In addition—extra years of efficient, economical operation are engineered into every model. Maintenance costs are surprisingly low. Drivers like the way Internationals handle, the exceptional comfort of International cabs.

Better talk it over with your International Dealer or Branch. He'll give you a lot more reasons why it's smart to consider an International *first!*

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Compare these great International Truck features:

- Silver Diamond valve-in-head truck engines are rugged, packed with extra power. Engineered to save you plenty on operating and maintenance costs.
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"Standard of the Highway"

International L-160 series offers 130 to 172-in. wheelbases, GVW ratings from 14,000 to 16,500 lbs., and a wide variety of bodies.

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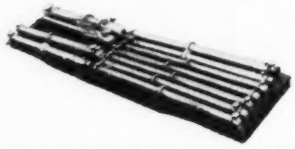
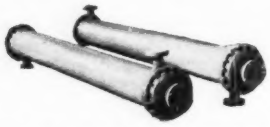


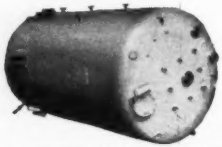
One of six carloads of Heat Exchangers, Coolers, Condensers and Reboilers designed and fabricated by our Heat Transfer Division. Materials used consist mainly of Type 304 Stainless Steel.



Two of four Steel Shell Condensers with Ampco 8 Heads and Tube Sheets. These condensers were built for export to the Middle East.

This condenser is 16" Dia. x 12' tube length; Bundle ¾" O.D. type 316 Stainless tubes; Double tube sheet also of type 316 . . . manufactured by the Heat Transfer Division of DOWNINGTOWN.

One of two all-Aluminum units fabricated by DOWNINGTOWN IRON WORKS, INC. (Welding was performed by the Inert - Gas - Metal - Arc method.)



One of 4 Fermentors, 12'0" x 22'7" high tangent, 10% Stainless Clad, type 304 Stainless . . . manhole body and connections type 304 Stainless. Each fermentor equipped with coils of 3" O.D. x 14 ft. tubing . . . type 304 Stainless.

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NEW YORK OFFICE 30 CHURCH STREET

Useful New Books & Government Publications

Worker Health, Sanitation

ROSENAU'S PREVENTIVE MEDICINE AND HYGIENE. *Seventh Edition. By Kenneth F. Maxcy, M.D. Published by Appleton-Century-Crofts, Inc., 35 W. 32nd St., N. Y. 1, 1951. 1,462 pages; 7 x 10 in., cloth. Price* $15.00

Two essential "ingredients" for food-plant proficiency—as all plant men know—are sanitation in processing and safeguarding workers' health. Very pertinent, then, is this current work relating specifically to the problems these factors create.

Topics such as food sanitation, industrial hygiene, occupational diseases, sanitary control of water supplies, and methods of sewage and waste disposal are treated in detail.

Shunning technical involvements, the work presents its material clearly and authoritatively. Actually, it is organized to include those fields of the medical and related sciences which form the foundation of public health work. Yet, its application to the food industry is everywhere apparent.

The author, Dr. Maxcy, has applied broad experience in compiling this extensive work. He is a professor of epidemiology in the School of Hygiene & Public Health, Johns Hopkins University.

Report-Writer's Handbook

WRITING THE TECHNICAL REPORT. *By J. Raleigh Nelson. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York City 36, 1952. 356 pages; 6¼x9¼ in., cloth. Price* $4.50.

Need for a primer formulating principles and procedures in writing the technical report has long been recognized. This well-reasoned presentation does much to fill the void.

Organizing ideas with oratorical clarity is one thing—putting them on paper another. And the job of making the technical report understandable tends to be further rendered difficult because (1) the subject matter often does not lend itself too well to plain-English description, and (2) the man handling the report frequently has not had sufficient training or experience in writing.

The book's value lies in the guidance it gives toward correcting these liabilities.

It is particularly sound in advocating that reports to be published in such media as industrial magazines should be tersely shaped for most convenient readability—with conclusive matter brought to the fore rather than being buried in the back.

Following fundamentals on writing, the author shows steps in styling and layout which add greatly to coherence. In addition, there are tips on how to recognize the crux of a subject and how to present it for enhanced clarity.

The author is professor emeritus of English, College of Engineering, University of Michigan.

Packager's Guide

MODERN PACKAGING ENCYCLOPEDIA, 1953. *Published by Packaging Catalog Corp., 575 Madison Ave., New York 22, 1952. 758 pages; 8½x11¼ in., cloth. Price* $2.

Three distinct services are availed by this handsome volume: (1) It is a guide for package planning, (2) it is a source of packaging ideas, and (3) it provides fingertip information on "who makes what" in the packaging field.

In the first category, numerous types of packaging materials—paper, film, foil, plastic, metal and others—are detailed and compared according to their advantages and limitations in meeting specific packaging needs. Function of the package—in many forms—is outlined on the basis of appeal, product protection, and general utility. Finally, packaging line equipment is perused.

Next, ideas for packaging are engendered by discussion and illustration of recent developments in many lines of the packaging field—where some $10 billion is expended annually.

Finally, a directory is provided. Here, in minutely classified form, is a list of makers of packaging materials and equipment.

Canning Primer

A "COURSE" IN CANNING. *Third Edition. By John L. Rogers. Published by Food Trade Press, Ltd., 7 Garrick St., W. C. 2, London, 1952. 187 pages; 5 x 7½ in., cloth. Price* 20s.

Helpful information of a "refresher" nature is stressed in this small work. Thus, it may be used as a primer for new plant men in the field of canning.

Touched upon are such operations as blanching, filling, exhausting, retorting, and cooling. There are also informative discussions on quality control, motion study, and notes on food spoilage—all related to the basic concern of preparing and canning food.

Role of the foreman is given separate treatment as an added feature.

Though possibly oversimplified, the work may be utilized in training new help or as a stimulant to those who need a brief accounting of the field as a whole.

Latest Tea, Coffee Guide

UKERS' INTERNATIONAL TEA AND COFFEE BUYERS' GUIDE: 16TH EDITION. *By William H. Ukers. Published by Tea and Coffee Trade Journal Co., 79 Wall St., New York 5. 424 pages; 5x7¼ in., paper. Price $3.*

This work provides ready reference and index to sources of supply in the tea, coffee, spice, and allied trades.

In addition, it contains statistical studies on leading exporting and importing nations. And there are latest consumption figures.

Edition covers 1952-1953 period.

Government Publications

MARKET DISEASES OF TOMATOES, PEPPERS, AND EGGPLANTS. *U.S. Dept. of Agriculture, Handbook No. 28. Price 40¢.* Designed to aid recognition and identification of diseased produce in marketing channels. Includes 15 photos, 8 in color.

COST OF PREPACKAGING POTATOES IN MAINE, MICHIGAN, AND PENNSYLVANIA. *U.S. Dept. of Agriculture, Farm Credit Admin. Report 163.* Analyzes costs of packing in various sized containers. Compares farm packing and centralized packing in 1950-51.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered directly from the Bureau responsible for its issue.

THE CALCIUM CONTENT OF COMMERCIAL WHITE BREAD. *U.S. Dept. of Agriculture, Bulletin No. 1055. Price 10¢.* Reports analyses of 402 bread samples collected in 41 states and D. C. in spring of 1949, averaging 334 mm. of calcium per 1-lb. loaf of bread.

SOME IMPROVED METHODS OF HANDLING GROCERIES IN SELF-SERVICE RETAIL FOOD STORES. *U. S. Dept. of Agriculture, Report No. 7. Price 55c.* Tells how advanced grocery handling methods increased productivity from 67 to 87 percent.

DETECTO SCALES

There's a precision-accurate Detecto Scale for your specific weighing and counting need. The Detecto helps increase production, yet assures you maximum accuracy by making slightest weight discrepancies immediately visible.

DETECTO ALUMINUM SPEED SCALE

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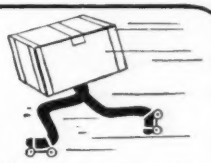

Whatever you have to handle — packages, units, cartons, castings, assemblies — you can keep them rolling — faster — at lower cost with conveyors.

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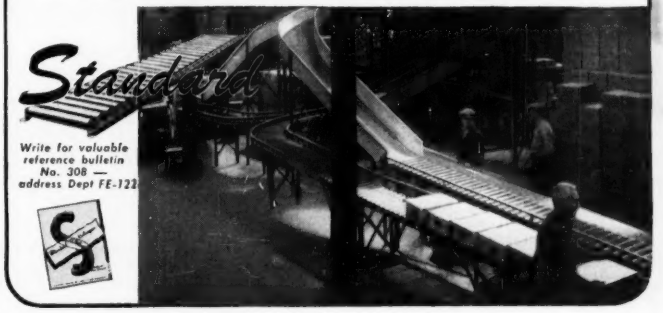
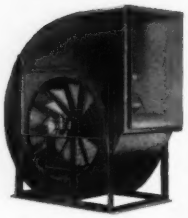
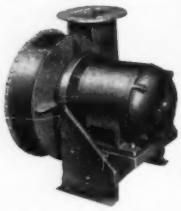


Write for valuable reference bulletin No. 308 — address Dept FE-122



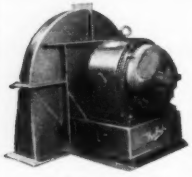
LIMIT-LOAD FANS

For large-scale ventilation. Quiet, non-overloading. Sizes up to 500,000 c.f.m. Bulletin 3737.



TYPE "CB" PRESSURE BLOWERS

For single-stage pressure blowing up to 2¼ pounds, per square inch. Bulletin 3553-A.

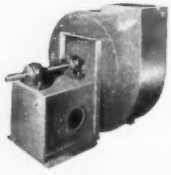


TYPE "CC" PRESSURE BLOWERS

In sizes for pressures up to 4 pounds and capacities up to 75,000 c.f.m. Bulletin 3553-A.

BABY CONOIDAL FAN

Compact, for portable or duct-connected service. Quiet, efficient. Bulletin 3499.



INDUSTRIAL EXHAUSTERS

With interchangeable wheels for air exhausting or materials conveying. All-welded. Bulletin 3576.

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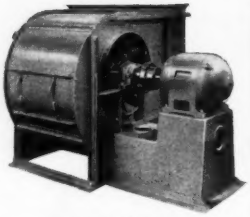
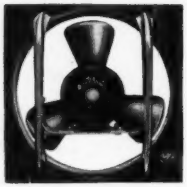
For light-duty ventilation and air conditioning service. Compact, non overloading. Bulletin 3533-C.



POWER PLANT FANS

PRIMARY, forced draft; induced draft — built for the severest service. Bulletin 3750.



BREEZO FANS

Easy-to-install wall fans. Durable and very economical. 6 sizes. Write for information.

There's a "Buffalo" FAN For The Results YOU Want!

With the complete line of "Buffalo" centrifugal, axial flow and propeller fans, you can pick your fans to pin-point specifications! You can pick the *right* fan for the volume desired —for pressure to be encountered—for the conditions of heat, moisture, cold, abrasion or corrosion expected. And with every "Buffalo" Fan, you get that careful engineering and construction that always means a satisfactory job. For the exact results you want, look to "Buffalo", First for Fans.

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AND IT'S "Buffalo" FOR CENTRIFUGAL PUMPS

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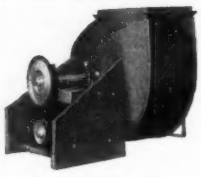
"Buffalo" FIRST FOR FANS

VOLUME FANS

For blowing or exhausting, up to 10" s.p. 8 discharge positions. Bulletin 3615-A.

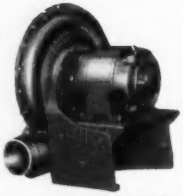


BELTED VENT SETS

Compact, "package" fans for duct or free-air delivery. Non-overloading. Bulletin 3720.

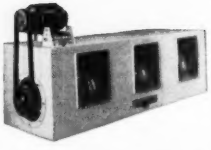
"RE" BLOWERS-EXHAUSTERS

Larger versions of "Buffalo" "E" Blowers, in sizes from 50 to 1600 c.f.m., for pressures up to 40" of water.



"E" BLOWERS-EXHAUSTERS

For oil or gas furnace blowing, line boosting, cleaning. Bulletin 3014-C.



SHORTBOY VENTILATING SETS

New high efficiency all-aluminum blowers with hollow shaft. Bulletin 3701.

BELT-AIR FANS

Efficient, quiet wall fans for free air delivery up to 19,000 c.f.m. Write for information.

KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

"C" Betters Grape Juice

Adding ascorbic acid to white grapes, after stemming and before pressing, prevents oxidization of extracted juice and thus preserves the original color while augmenting nutritive value.

So says New York State Agricultural Experiment Station, which developed the method.

After pasteurizing juice from grapes thus treated, bacterial growth and enzyme activity are halted. Otherwise flavor and color changes and sedimentation would result.

Avoids Brittle-Printed Film

A special method of printing cellophane, called "Normalizing," is reported to eliminate dehydration of the film caused by conditions attendant to high-speed printing and ink drying.

The latter have constituted a problem in making for brittleness.

The new method, developed by The Dobeckmun Co., of Cleveland, is stated to afford moisture control during the printing of roll film, so that the film retains its original pliability. Thus, optimum performance is stated insured during heat-sealing and subsequent handling.

Pineapple Plant for Florida

First southeastern U. S. pineapple canning plant—featuring straight-line production and utilizing modern methods—is slated to start operations in mid-January at Riviera Beach, Fla.

Known as The Florida Canning Fruit Co., it will have an output of 1,500 cans of sliced and crushed Cuban pineapples per 8 hr. shift. Heading the new concern is Hernan Henriquez, operator of a pineapple plant in Havana.

Waste material from the new facility will be utilized in a cattle-feed byproduct.

Yellow Oleo in Washington

Washington became the 42nd state to permit sale of tax-free yellow margarine when its voters abolished the ban on the product last month.

Only six states—Iowa, Minnesota, Montana, South Dakota, Wisconsin, and Vermont—still have laws against sale of the yellow product.

Close to $Billion Outlay Planned By Industry in '53—A 7% Rise

Firms in the food field are drafting high capital expenditures for the new year—running to an overall figure 7 percent above 1952.

This "going up" picture has just been revealed by a broad survey of industrial company investment projects completed by the McGraw-Hill Department of Economics.

The economists' preliminary data gage expenditures as climbing to a total of $998 million in '53, as against an estimated $933 million in '52 and an actual $968 million in '51. The latter two figures are from the Department of Commerce.

▶ Planned rise of outlays in the food field is significant in that it is second only to the plus-15 percent figure judged for the electrical machinery field. And it contrasts with the overall 8 percent drop calculated for all-manufacturing.

As food processors raise their sights for '53, it is also to be noted that they have actually been spending more than they originally planned in '52.

The food figure takes the group as a whole in ranging new year outlays. In breakdown, it is thought that at least one branch—the canners—will probably spend somewhat less in '53.

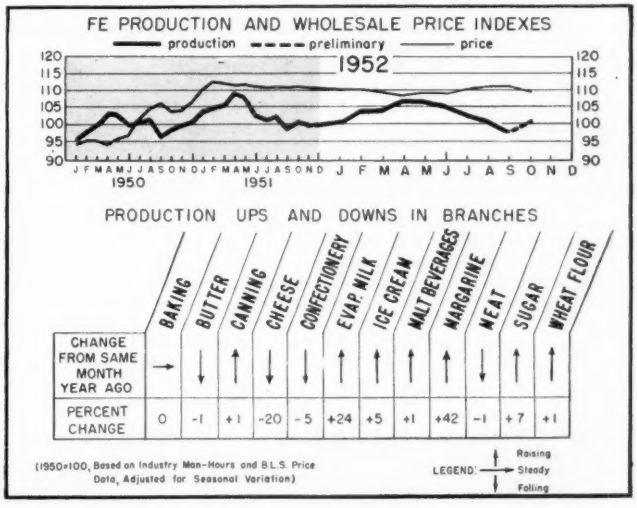
Moving to the nation's general industrial outlook, the economists find retail trade on the upswing, with output of consumer goods at the highest level since mid-1951.

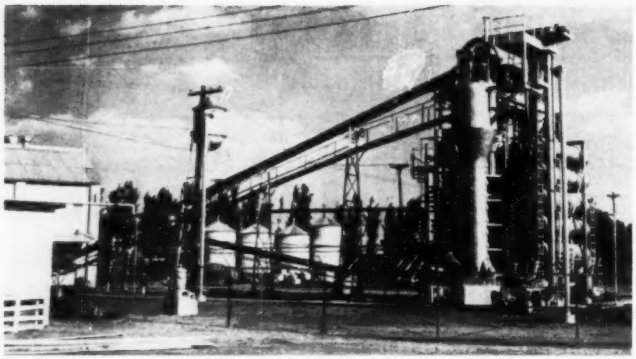
States the report: "Present strength in consumer lines is supporting many of the more ambitious plans for capital expenditures. Any drop in consumer spending would be quickly reflected in sales and profits of industrial companies and would probably cause substantial downward revisions in capital spending plans.

"Consequently, some very hard selling—particularly at the retail level—may be needed in order to justify present plans for capital expenditures and assure continuing good business after mid-'53. But the chances are greatly improved by the relatively high level of present investment plans."

Frozen Peas Rocket

Greatest pack of frozen green peas ever recorded is being hailed by the National Assn. of Frozen Food Packers, whose preliminary gaging puts the 1952 total at 204,606,874 lb.





Ups Soybean Processing

With this new outdoor solvent plant in operation, Hemphill Soy Products Co., of Kennett, Mo., can run 80 tons of soybeans per 24-hr. period. The unit, designed as a "Series 8", was supplied and erected by V. D. Anderson Co. of Cleveland.

Quality-Control Ideas Get Spotlight At Bakers Meeting in Chicago

Best method of examining milled products is to sift four bags through a 30-mesh screen, declared Louis A. King, Jr., of the American Baking Institute, in his address before the recent American Bakers Assn. convention in Chicago.

If insects are found, then six additional bags should be sifted. And a lot should be rejected if there is an average of more than one-half an insect per bag.

Tailings from the sifter in the bakery should also be examined daily for insects and extraneous matter. Laboratory examinations of ingredients and finished products are also desirable, since they not only show a trend but also intent to comply with sanitary requirements.

"Staph" Food-Poisoning Research—Tank production of food-poisoning staphylococcus cultures is being undertaken to provide adequate supplies of anterotoxin for a research team now working on the project, reported G. M. Dack of the University of Chicago.

Also, the Atomic Energy Commission is supporting a study to determine whether radiation from cobalt-60 will effect the production of enterotoxin by staphylococcus or destroy this toxin in cultures or foods. And other recent work indicates that combinations of some of the antibiotics may inhibit growth of food-poisoning staphylococcus.

Taste-Testing Panels — Panel-type taste testing is useful in maintaining quality control, particularly if there is a change in processing or in an ingredient that will alter the flavor of the product. That is the opinion of D. M. Meisner, American Institute of Baking, Chicago. He went on to credit panels for their guidance in the improvement of the flavor quality of a product.

As these panels develop a more analytical approach, they can even distinguish component parts of the total flavor. Thus, a flavor profile can be developed for the purpose of adjusting the addition of flavors to achieve a proper balance. Further training will enable panel members to detect and identify foreign or off-flavors.

Shortenings for Pies—Based on the weight of flour, bottom crusts may contain 50 to 55 percent shortening, according to J. B. Woerfel, Armour and Company, Chicago. Juicier pies require a tougher bottom crust to enable them to resist soakage that results in sogginess. A flaky crust—generally made with a firm-textured lard (115-125 deg. F. melting point)—is preferred to a mealy one.

For the upper crust, a rich mix, usually made with 60-65 percent shortening, is desirable. This richness enhances eating qualities. The shortening may also be slightly softer than that required for the bottom crust.

Recently, 50-lb. lots of shortening have been offered to bakers. Preweighed, the shortening is packaged in a carton (corrugated or solid fiber) lined with greaseproof polyethylene, or a similar material. One man can strip off the wrapping and add the entire block of shortening to a batch, thus eliminating former weighing operations.

Two Losses and One Win For Substitute Ice Cream

On the "synthetic" ice cream "front," the month saw: rejection of this type of dessert in Indiana, reaffirmations against it in Ohio, but dispensation in Oregon.

Sale and manufacture of such vegetable fat frozen desserts in the state of Indiana was prohibited by a ruling in the Superior Court of Marion County. It was held that, under the state's food and drug act, this kind of product is adulterated and misbranded.

In Ohio, the director of agriculture has promised full enforcement of state laws forbidding use of foreign fats in ice cream or any frozen dessert in the state.

Meanwhile, the Oregon State Department of Agriculture has ruled that so-called vegetable fat ice cream may be legally sold in Oregon provided the substance is labeled "imitation ice cream". A list of the ingredients must be included on the label.

The Department explains that such products do not conform to identity standards for ice cream. Therefore they are held to be not covered by the state's frozen dessert law, falling instead under the state's labeling requirement for an imitation product.

New Styrene Film, Sheets

A transparent polystyrene film, designated as Q641, is now being produced for experimental purposes by the Dow Chemical Corp., Midland, Mich.

On permeability to gases (oxygen and CO_2), this film is rated between cellophane and cellulose acetate. Hence, the maker believes that it will show great promise as a film for prepackaging fresh produce. Also, its possibilities for prepackaging fresh meats is not being overlooked.

Offered, too, are Styron 475 sheets, available in 20 mil thickness. These sheets may be substituted for cardboard trays or boats.

Ups Mushroom Yield

Mushroom output has been increased from 2 to 6 lb./sq. ft. of culture bed through better pasteurizing of the beds. The new system has been developed at the USDA Plant Industry Station, Beltsville, Md.

High points of the method are: (1) Addition of poultry litter supplement; (2) shorter outdoor composting of manure; (3) carefully controlled pasteurizing of beds at 150 deg. F.; (4) forced ventilation of growing rooms, and (5) use of special pesticides.

ARI Goes Into Action

Range of organization and activities was clarified in the recent first meeting of the new Agricultural Research Institute, which has been formed under the auspices of the National Academy of Sciences-National Research Council.

Purpose of ARI is to promote collaboration of industrial, academic, and governmental scientists in fields of agricultural research and procedures, with best utilization of the nation's agricultural resources the goal.

Proposed by-laws call for contributing members (Class A) to include: Corporations engaged in production, processing, and marketing of agricultural products; corporations engaged in the making of equipment, materials, and supplies used in the production, processing, transportation, and marketing of agricultural products; and corporations and associations conducting scientific or economic research on projects related to agriculture.

Members of the ARI will be technical representatives of the organizations accepted for membership, and officers are to be elected by the group.

Hors d'Oeuvres

▶ Developed in Frankfurt, Germany, the hot dog is celebrating its 100th anniversary by being eaten to the tune of 6½ billion. They say a butcher's Dachshund inspired the frank. Anyway, it took a lot of guts to develop the business.

▶ Why birds open milk bottles on doorsteps still perplexes the British. Seems the real mystery is why it took the feathered creatures so long to discover that milk is a top-flight food.

▶ Americans spent $1,620,000,000 for candy last year. A small price to pay for keeping the ladies happy.

▶ New York's metropolitan area produces half again as much brew as the city that beer made famous. What with the high cost of shipping fluids in bottles, Louisville better look to its laurels.

▶ Descendants of the founders of 100-year-old Anheuser-Busch are caring for the descendants of the firm's original yeast plant. And A-B now sees unlimited possibilities for dried yeast in the century ahead. A virile centenarian is Anheuser-Busch.

▶ In old Vienna, homemakers may obtain a dinner recipe by dialing A-0-60. Football results also are dialable. So a wrong number could give you griddled pigskin for dinner.

▶ A certain large bakery serves free coffee in its plant. One way to keep workers awake.

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Nicholson Expansion Steam Traps

SAVE $155 PER UNIT

for Large Processor

Because of their positive effectiveness in temperature control work, Nicholson expansion steam traps, at about $35 each, are being installed by a leading processor in place of temperature controls. These were costing them $110 to $200, with cost of trap added. Per installation, the saving is about $155.

This firm is finding an increasing number of applications on tanks, stills, heating radiators, etc., where Nicholson expansion steam traps are serving as both trap and temperature controller.

Because there is only one moving part, remarkably low maintenance costs are being shown. Easily installed, usually without supports. Lengths, 9" to 40". Pressure, 0 to 250 lbs. No air binding.

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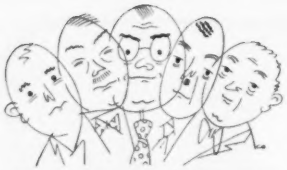

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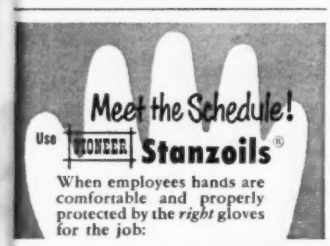

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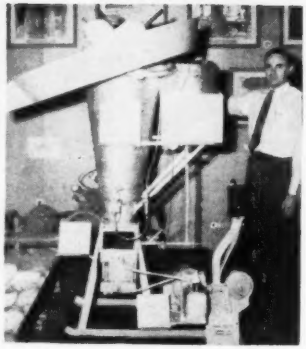

Quick-Action Ice Maker

This extrusion-type bulk-ice generator—capacity 1 ton per 24 hr. for about 70 kwhr.—was especially developed for supplying large quantities of cheap crushed ice for fisheries, dairies, meat and poultry shippers, fruit and produce packers, and other branches of the food industry. Experimental model is seen exhibited by patentee, Prof. John R. Watt of University of Texas.

Pre-cooled water enters tapered freezing chamber and emerges from top as 6-in.-thick ice, which breaks into pieces ranging up to 20 lb. in weight. A low pressure hydraulic pump and cylinder provide lifting force, and a chute delivers the ice into desired channels. Machine is powered by a 3 hp. Freon compressor.

By means of Watt's incremental film process, freezing of ice is from inside out, and rate is high since previously formed ice does not insulate remaining water from refrigerating surfaces.

Separates Flour Gluten, Starch, and Solubles

A mass fractionation technique has been perfected for large-scale separation of flour into gluten, prime wheat starch, small-granule wheat starch, and solubles, according to U. S. Department of Agriculture.

The process was conceived during a research contract by American Institute of Baking for the Northern Regional Research Laboratory, Agricultural Research Administration. Still needed is engineering development from the large-scale laboratory technique.

Publication of the details of the work may be arranged soon. In the meantime, those interested in further investigation of this wet process should contact Dr. C. E. Rist, Bureau of Agricultural & Industrial Chemistry, Peoria 5, Ill.

Purpose of the process is to separate sufficient amounts of the gluten, starch, and solubles for production of standard-size loaves of bread for systematic taste-panel and laboratory tests during the aging of bread. It was found that the gum gluten "can be stored frozen for a period of at least 4½ months without appreciable deterioration of its bread making qualities."

Introduces New Film

An entirely new film stated to have unusual strength, heat resistance, and insulating qualities has been developed by the du Pont Co.

Trade-marked "Mylar", it is a condensation polymer obtained from ethylene glycol and terephthalic acid. Thus, it is chemically similar to this firm's newest textile material, "Dacron" polyester fiber.

This polyester film is reported as sparkling, transparent, colorless, tough, and durable. Maker states it retains its flexibility at low temperatures, has high dimensional stability under heat and humidity changes, and has good resistance to chemicals.

Mylar's strength, termed "double and more", is stated to make possible thinner gages.

Cheese From Cottonseed

Curds precipitated from cottonseed protein solutions can be ripened into good vegetable cheese, in the opinion of Dr. W. W. Meinke, associate research chemist, Texas Engineering Experiment Station.

Essential steps in his experimental process are: (1) Preparation of "milk" through action of salt solutions on cottonseed proteins; (2) precipitation of protein by acid or action of lactic acid bacteria, and (3) ripening of curds by specific bacteria.

Fly in the ointment at present is purple color of curds that so far has defied complete removal.

Honey-Mixed Baked Goods

Scientists at Kansas State College have found that honey imparts a rich bloom and brown color to cakes and sweet-dough items (doughnuts and rolls).

Recommended, for example, is substituting of honey for one-third of the sugar in a cake formula. Additional baking powder is required, however, because of the acid in the honey. The honey will give the cake a distinctive taste, aroma, and color as well as better keeping quality.

The same substitution in a chocolate cake requires the addition of a third more cocoa.

Studies on sweet-dough goods in-

dicated honey can be used to replace all the sugar. Here, honey is reported to improve the color, richness, sweetness, softness, keeping quality.

Possibilities of honey keeping Army survival biscuits softer and more palatable are now being examined.

Supply, Prices Steady

Ample food is in prospect for '53 to meet continuing strong demands—a supply at least as large as in the past three years, given normal weather conditions. And retail prices are likely to average about the same as in '52.

This is the summary of the Bureau of Agricultural Economics, USDA, which in breakdown expects somewhat increased consumption of beef and veal, chicken, margarine, frozen fruits, fruit juices, and vegetables, countered by a bit lower consumption of pork, eggs, turkey, and butter.

Important in outlook is expectation of larger marketings of meat animals and a rise in output of fruits and vegetables. Military procurement is seen approximately that of '52 unless there is a decided change in the international situation. Export shipments from the U. S., bulk of which are grains, are on the decline.

Curtis E. Maier

Heads Illinois Tech Council

Newly named chairman of Illinois Institute of Technology's Food Engineering Council is Curtis E. Maier, general manager of research for the Continental Can Co., Chicago.

Plans call for Mr. Maier's appointment of four committees to (1) evaluate methods and equipment used in food preparation, (2) study the professional status of food engineering, (3) advise on methods to encourage industrial research in food engineering, and (4) advise on ways to encourage young men to seek careers in food engineering.

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STEEL MESH CONSTRUCTION protects against loading impacts. FLEXIBILITY FEATURE allows belting to gain a tighter grip on the friction drum . . . puts an end to creeping, weaving, jumping—thus, it assures a perfectly flat surface for containers, empty or filled. OPEN MESH provides circulation or air and liquids around products in process and makes cleaning faster and easier. Highly resistant to heat, cold and steam. Find out how La Porte can increase *your* food processing efficiency.

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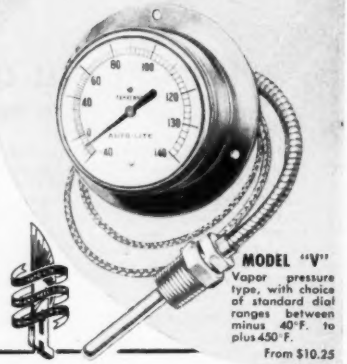

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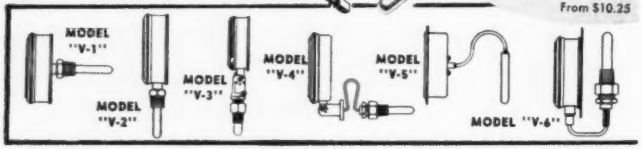

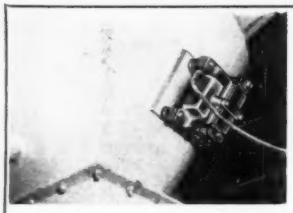

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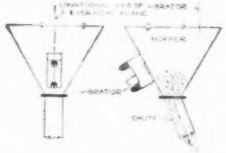
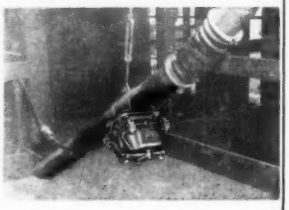
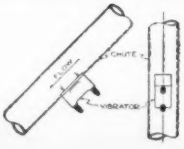




Now, Syntron presents a complete line of Semi-Noiseless Electric Vibrators for use in installations located close to workers where noise is a major factor.

They operate the same as standard Syntron Vibrators—assure a smooth, controlled flow of material—prevent loss of costly time due to material coming 'short' on dependent operations and prevent loss of material due to 'surges'. New 'cushion' action provides a sharp reduction in the operating noise.



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F&DA Food Standards

Ice cream standard of identity hearing continued about as it was going a month ago. Cross-examination of witnesses on surface-active agents, from the standpoint of pharmacologic and other technical evidence, showed little sign of abating.

In mid-November, F&DA cross-examination of Swift & Co.'s witness (Dr. Eagle) was scheduled, with some indication that his data tended to support the F&DA position on food emulsifiers.

Dec. 1 was set as the date for new evidence to be presented by a number of interested persons not previously heard. Food & Nutrition Board of National Research Council planned to present a statement "favoring adoption of standards for ice cream to encourage maximum utilization of nonfat milk solids, and favoring standards for related products containing less fat and more non-fat milk solids than would be allowable for 'ice cream'."

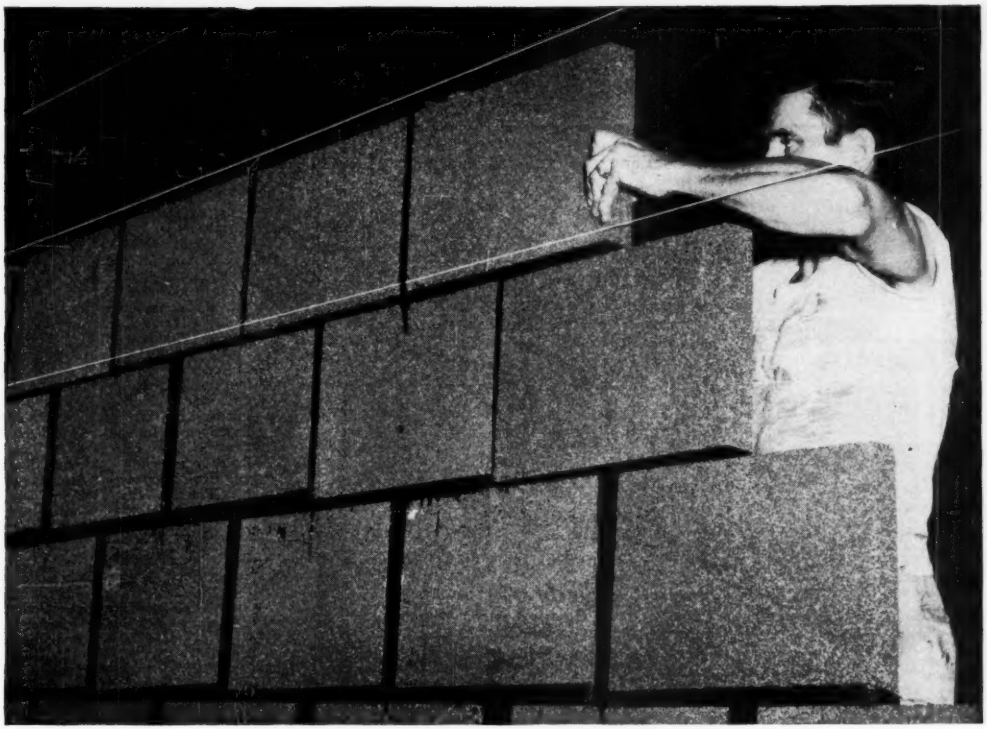
Dr. Leroy Voris, the Board's Executive secretary, said in addressing the F&DA that the statement was "in the direction of nutritional benefit to consumers" in the opinion of the Board.

Also to be heard in early December were: National Dairy Research Laboratories, on the use of hydrolized lactose as an optional ingredient; Yami Yogurt Products, favoring inclusion of yogurt as an optional sherbet ingredient and proposing to establish a definition and standard of identity for yogurt sherbet; and Tennessee Eastman Co., planning to present data intended to justify use of "Tenox" antioxidant as an optional ice cream ingredient.

No request had yet been received from any interested person desiring to establish a definition and standard of identity for a frozen product resembling ice cream but made with vegetable fat rather than butter fat.

Adjournment of the hearing near

"I JUST GOT CANNED!"



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• You've probably seen it happen. With each passing year, refrigeration power costs go up steadily as the insulation efficiency goes down. The stop-gap vapor seals begin to fail, and water vapor begins its steady march through ordinary insulation.

Sometimes the floors and ceilings and walls heave and buckle as the trapped condensation freezes and expands within the insulation. This is the beginning of the end, and soon the soggy insulation must be ripped out and dumped in the trash barrel.

In contrast, FOAMGLAS acts as a vapor seal all by itself. It will not absorb water or transmit vapor even without a protective coating. When properly installed, FOAMGLAS may be considered impervious to moisture—the No. 1 destroyer of ordinary insulation.

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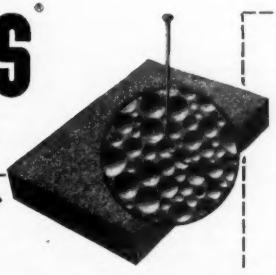

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December

8-11—National Coffee Assn., Boca Raton, Fla.

January, 1953

5–31—Fundamentals of Dairy Manufacture Short Course; University of Minnesota, Minneapolis.

10–14—United States Brewers Foundation, 77th annual convention; Waldorf-Astoria Hotel, N. Y. C.

12–24—Ice Cream Plant Men's Short Course; The Pennsylvania State College, State College, Pa.

19–22—Plant Maintenance Show & Conference; Public Auditorium, Cleveland.

19–22—Annual Training School for Processors' Fieldmen; Michigan State College, East Lansing, Mich.

23—Pennsylvania State Ice Cream Conference; The Pennsylvania State College, State College, Pa.

26–30—International Heating & Ventilating Exposition; International Amphitheatre, Chicago.

29—Barley Improvement Conference, Midwest Barley Improvement Assn. and Malt Research Institute; Hotel Nicollet, Minneapolis.

February, 1953

9–13—Food Processing School, Food Technology Dept.; Oregon State College, Corvallis, Ore.

14–17—Institute of American Poultry Industries, annual fact finding conference; Kansas City Municipal Auditorium, Kansas City, Mo.

17–20—National American Wholesale Grocers; Morrison Hotel, Chicago.

27—National Transport Vehicle Show, New York City.

New Low-Temperature RCA Victor Test Laboratory Sub-cooled with

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Refrigeration

Temperatures down to 85 degrees below zero are maintained by a 3-stage Frick system in this altitude-temperature-humidity chamber of the Radio Corp. of America at Camden, N. J.—where two other test rooms are also cooled to minus 100 F. by Frick refrigeration. All built by Tenney Engineering, Inc., with offices at Newark and Baltimore.

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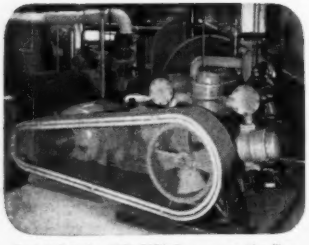

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the year-end is possible, with Jan. 8, 1953 marking the second anniversary of this resumed hearing. Transcript p. 19943 was to be the next page when the hearing resumed just after this writing.

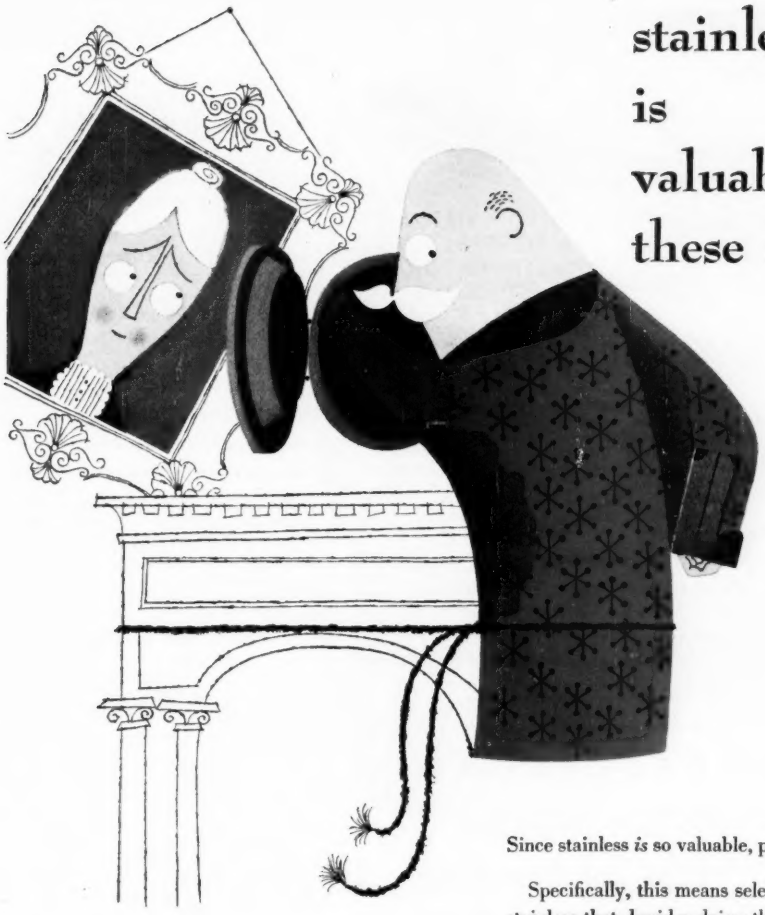
Supreme Court hearing of the Cardiff case was scheduled as this issue went to press. A decision here will probably be forthcoming about the first of the year. This was the case in which F&DA inspectors were barred from a food plant when its management decided not to grant permission for entrance and inspection (FE April, p. 200, and June, p. 203).

Bread standard of identity, appealed by emulsifier manufacturers, may be decided by the Third Circuit U. S Court of Appeals in December. Final briefs were filed in Philadelphia on Nov. 3.

USDA Grade Standards

Recent actions by Production & Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards and related activities include the following:

Dried currants, correction in standard (published on p. 8415, Sept. 19



stainless is valuable these days

Since stainless *is* so valuable, plan to make it go further.

Specifically, this means selecting a grade or finish of stainless that, besides doing the job adequately, will be in less demand than one you have been figuring on.

Here is where Crucible can help you out. The matchless experience of our metallurgists and stainless fabricating specialists can help you get the most out of your share of stainless.

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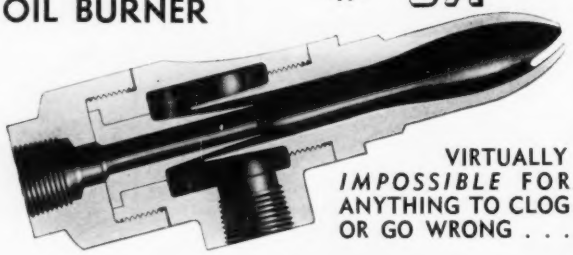
OIL BURNER type "SA"



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CORK INSULATION

Federal Register) adds a "Substandard" paragraph, p. 9130, Oct. 15 *Federal Register*.

Canned mushrooms, second revision, proposed, p. 9204, Oct. 17 *Federal Register*, written comments received until Nov. 16.

Canned carrots, third revision, proposed, p. 9749, Oct. 29 *Federal Register*, written comments received until Nov. 28.

Frozen mixed vegetables, new, p. 9919, Nov. 4 *Federal Register*, effective Dec. 4.

Cauliflower, revised, proposed, p. 10266 Nov. 11 *Federal Register*, written comments received until Nov. 26.

—End—

Dough Dusting Advance

—*Continued from page 75*

dusted as they travel through divider, rounder, overhead proofer, and molder. Doughs dusted are those used for rye, white, graham, raisin, and whole wheat loaves.

Equipment used to make up Vienna and Kaiser rolls is also effectively starch-dusted by the new system at Gottfried's.

Essentially, the new system consists of a small dispersion chamber, where a very fine cloud of starch dust is formed and then carried, under pressure, to application points at the make-up equipment. And from these hooded application points, a suction fan carries excess starch through ducts to a dust collector.

The unit in action: Air from a high-pressure line is first purified (see diagram). Employed are a fabric-type oil filter and a silica-gel dehydrator. Free from oil and moisture, this air now enters the dispersion chamber. Here, it forms the fine cloud of powder-laden air for feeding to the partially enclosed application points. An aspirator at the outlet from the dispersion unit augments the pressure already in the system.

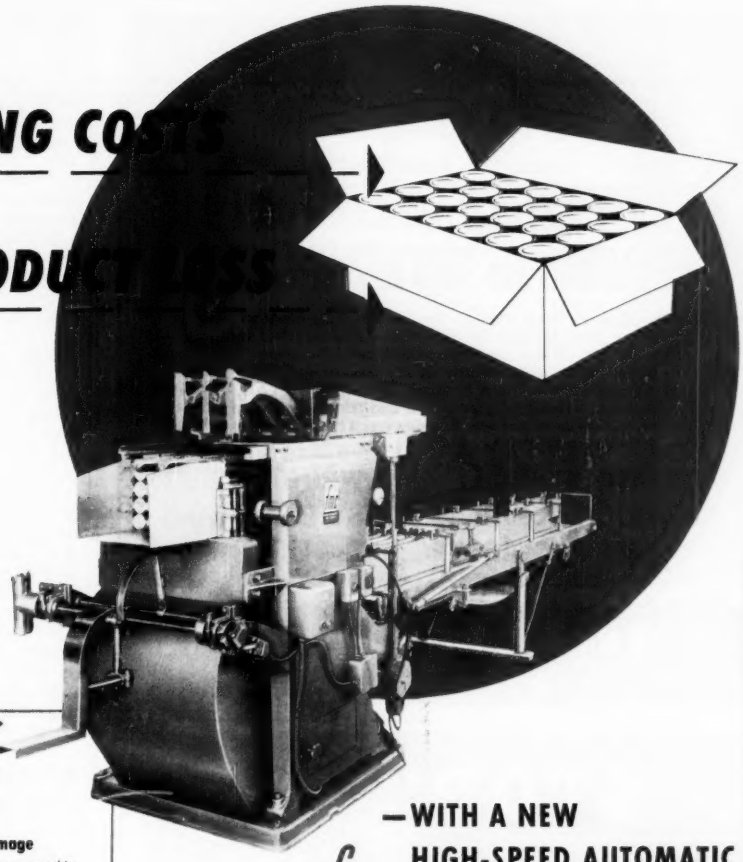
Amount of starch dusted on doughs is controlled by an air-pressure regulator, which is set at about 25 psi. at the dehydrator. As the air pressure in the chamber is increased, more starch is dusted on the doughs.

Starch is intermittently fed into the chamber from a 65-lb. capacity stainless steel bin. An electric timer, operating for a fraction of a second on every 30-sec. cycle, actuates a solenoid valve to feed the required amount of starch to the chamber. Simultaneously, the air line is closed.

This pneumatic system has eliminated seven mechanical flour-dusting boxes at Gottfried's bakery—two at

CUT CASING CO

STOP PRODU



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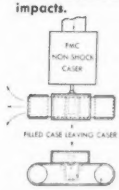
Bead-to-Bead Contact Eliminates Can Dents and Damage

Cans enter the machine upright, move smoothly along woven wire belt, and are gently transferred to the case. No rolling—no damaging impacts.



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Choice of take-away in any direction from the caser, for most efficient flow-line.

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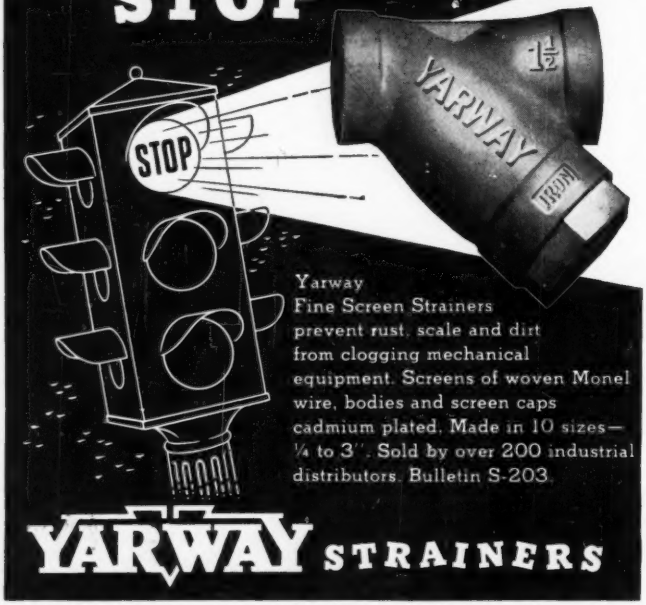

Yarway Fine Screen Strainers prevent rust, scale and dirt from clogging mechanical equipment. Screens of woven Monel wire, bodies and screen caps cadmium plated. Made in 10 sizes—¼ to 3". Sold by over 200 industrial distributors. Bulletin S-203.

YARWAY STRAINERS

YARNALL-WARING CO., 127 Mermaid Ave., Philadelphia 18, Pa.

the divider, two at the rounder, and three at the molder. The stainless steel starch-application hoods are located at the divider, rounder, and molder. At the divider, the dust is sprayed from a ¼-in. pipe onto a belt carrying dough to the rounder. Pressure at this point is 5 psi.

At the rounder, balls of dough are dusted at two points—as they emerge from this unit and as they chute to a belt carrying them to the overhead proofer. Two jets, within a hood mounted adjacent to the rounder, spray-dust the dough under 5 psi.

On the molder there are two spray-jets that starch-coat doughs, under 1-2 psi., as they are belt-conveyed to the extender board.

Excess starch is prevented from escaping into the room at the application points. A 16-in. suction fan, maintaining an air velocity of 300 ft. per min., carries the starch through 4-in. ducts to a dust collector, where it is filtered and re-used. Employed here are 24 filter bags. Each measures 4 x 28 in.

The pneumatic dusting units are manufactured by Craig Corp., N. Y. C., whose president, H. Cole, developed this system for starch-dusting doughs. Joe Lowe Corp., N. Y. C., is handling distribution and installation of the system in bakeries.

End (Resume reading on page 76)

6 Mixers Do Work of 28

—*Continued from page 111*

Air-operated controllers were selected because they are safer in dust-filled rooms than the electric ones. To prevent carbonization of starch in the dryer due to shutdowns, a solenoid valve shuts off the air supply in event the unit stops running. In turn, the steam valve to the dryer closes.

Also employed in the control system are explosion-proof switches and magnetic starters for the motors. All wiring of switches and starters conforms to the National Fire Code and National Electric Code, as recommended by the National Fire Protection Assn.

Marshmallows coming from the curing rooms and depositors are now fed to a canvas-belt conveyor, traveling along the center of a packing table. Flanking this belt are plastic-coated conveyors carrying empty quarter-unit (4 oz.) cartons lined up between spacer lugs. Girls on each side of the table hand-pack marshmallows into these units, then they are machine-wrapped with wax paper.

To provide further protection, the 4-oz. cartons are again overwrapped with a wax coated paper. After this

operation, the package is further wrapped with a printed paper. Four of these units make the 1-lb. package. Object of the 4-in-1 package is of course, to permit the customer to use portions of the confections as needed while freshness of the rest is protected.

The completed 1-lb. packages are fed to an adjustable packer that loads 12 or 24 into a shipping case. Finally, the cases are automatically glued, sealed, and chuted to the shipping room floor.

The whole process, from raw materials to final packaging, is laboratory controlled.

End (Resume reading on page 112)

Balking Algae

—Continued from page 74

fected. For this reason, sterilization of a plant to overcome such contamination must embrace the entire operation—all its functioning units.

There must be a complete machine breakdown and all parts must be scrubbbed with brushes and a detergent solution that will remove accumulated dirt, grease, syrup—and algae. Parts should next be rinsed with a mild, hot chlorine solution (4-6 ppm.) until detergent and residual dirt are removed. Then they should be placed in a receptacle (wooden, stainless steel, or porcelain-lined), and covered with cold water containing 1 oz. of 12.5 percent chlorine (sodium hypochlorite) for every 25 gal. (This ratio equals a 25 ppm. Cl solution.)

After 30 min., parts should be removed and reassembled. Sand and carbon beds should be back-washed. Cooler plates, filters, and all other apparatus, should be sanitized. The job must be complete—for at any point that is overlooked a foci of infection is invited. And this will recontaminate the entire bottling line.

Finally, every measure should be taken to maintain in the plant the optimum sanitary conditions that foster manufacture of a sterile product.

End (Resume reading on page 75)

New Cheese Plant

—Continued from page 96

are prepared, the build-up of this crew draws men from most of the other departments, where they have finished, or nearly completed, their other work.

Like a jig-saw puzzle, men come from all the other departments and

Pickles Processed
better, faster, cheaper!
● More attractive color, more uniform appearance, faster processing, maximum production, and reduced maintenance, production and labor costs! No wonder many leading pickle processors who installed Cyclone Stainless Steel Flat Wire Belts are more than satisfied with the results.
Pickle processing is only one of many special problems that confront the food industry. Many food processing problems can be solved by the installation of one of Cyclone's three belt types—Flat Wire, Spiral Woven and Flex-Grid. For more information on how others have done it, send to Dept. H-122 for a copy of our Catalog #4.
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CYCLONE FENCE DEPARTMENT
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obsolete machines, tools and equipment, no-longer-used jigs and fixtures, worn-out or broken chains, wheels, pulleys, gears, pipe, tanks, drums and abandoned metal structures. Non-ferrous is needed, too!

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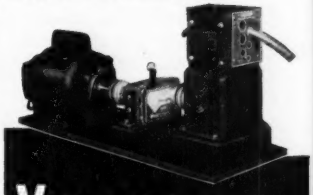

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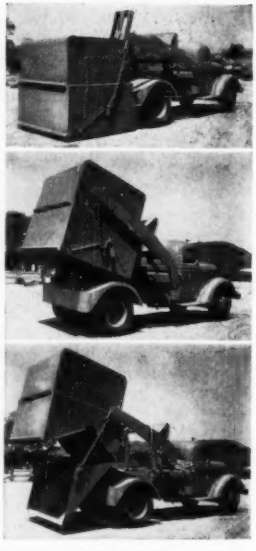
One Dempster-Dumpster mounted on one of your trucks serves any required number of big detachable Dempster-Dumpster Containers spotted at convenient materials accumulation points inside and outside your buildings. The capacity of these containers range up to four times greater than the average dump truck body. They are built in a wide variety of designs best suited to the materials handled—be they solid, liquid or dust . . . trash or rubbish . . . bulky light or heavy. The truck-mounted Dempster-Dumpster, with only one man, the driver, picks up one pre-loaded container after another, hauls it to destination where materials are dumped or load set down intact. The Dempster-Dumpster may handle raw materials on one haul, liquids on another, trash and rubbish on another, etc. It's like having one truck with 15, 25, 65 or 100 different bodies.

This is the *Dempster-Dumpster System*—the modern method of bulk materials handling. It is saving thousands of dollars annually for hundreds of plants in every type of industry because it: Eliminates 3 to 5 conventional trucks and crews—reducing cost of truck equipment and operation accordingly. . . Eliminates standing idle time of trucks and crews. . . Eliminates re-handling of materials. . . Increases efficiency, sanitation and good housekeeping.

The *Dempster-Dumpster System* is, without question, the most efficient method of materials handling by truck ever devised! More efficient and lower cost materials handling in your plant may be simply a matter of getting the minds of your engineers and ours together. Write us now. The *Dempster-Dumpster System* is manufactured exclusively by Dempster Brothers, Inc.



WHEN A CONTAINER is full, the Dempster-Dumpster picks it up, hauls it to destination and dumps the materials or sets the load down intact. These three simple operations, shown above, are hydraulically controlled by driver in truck cab.

DEMPSTER BROTHERS, 7122 Shea Building, Knoxville 17, Tenn.

fall into their respective jobs in the make-room.

Men cutting the coagulated milk into curd follow the cheesemaker as closely as the process permits. And following them is the two-man crew removing the curd from kettles and hooping it. It takes about 2½ hr. from the time the milk enters the kettle until the curd is lowered into the hoop. Then the men are released, in planned sequence, from this work, to return to other duties or become part of the cleanup crew.

Butter-Making, Whey Drying

All whey is centrifuged, and the butterfat separated from it is made into sweet-cream butter. Average daily output is 600 lb. A part of this is sold locally in 1-lb. prints. The remainder is shipped to Salt Lake City, in 68-lb. cubes.

Because of its high quality, the sweet whey powder made by Star Valley commands a 2c./lb. premium over powder made from Cheddar cheese whey. De-fatted whey is pumped from the separators to a 5,000-gal. insulated storage tank. At about 11:30 a.m. this supply is adequate to begin further processing. A centrifugal pump moves it to the heat exchanger, where temperature of the whey is raised to 190 deg. F. (boiling point at this altitude is 192 deg. F.). It then flows to the 1,000-gal. hotwell that supplies the vacuum pan. Flow from hotwell to the first stage is 35 gpm.

Temperature in the first stage is 170 and in the second 120 deg. F. Vacuum, developed by steam jets, is maintained at 28.5 in. in both effects. Whey is concentrated to approximately 15 percent solids in the first effect and to 50 in the second. It remains in the two pans for approximately 30 min. Concentrate is then pumped, under varying pressure (400-800 psi.), at a rate of 7,000 lb./hr. to the spray dryer. This unit has four main heads (four sprays each).

Drawn through a series of coils heated by 110-psi. steam, hot air is blown into the dryer at 190 deg. F. A fan, powered by a 7½ hp. motor, delivers this wind blast through four ducts which enter the dryer opposed to the sprayed whey. Final moisture content of the dried product is 3 percent. It is packaged, next morning, in 275-lb. fiber drums.

The entire whey-drying process is controlled from a central panel board equipped with automatic instruments, making it possible for one man to operate this department. Once it is on-stream, he can leave for intervals and work in the make-room.

Two 300-hp. boilers provide low-pressure steam (15 psi.) for plant heating and high-pressure steam (110 psi.) for the process. They are coal (stoker) fired and equipped with dust collectors to eliminate flyash. Boilers are 100 percent automatic and equipped with dual safety devices.

After pressure is brought up in the morning, the boilers operate without a fireman's attention. An IBM time clock substitutes for a constant attendant. Each hour, an appointed employee leaves his other duties and checks the water level, steam pressure, and fire intensity. He notes these factors on a card and inserts the card in the clock, which automatically records the time this inspection was made.

In addition, notations are made on this card to indicate when boiler blowdowns have been made and when popoff valves were discharged. He then returns to his main duties.

The plant engineer tends to the stoker lubrication, and indicates on his log the day of the week this was done. He also jots down the day the zeolite water softener was regenerated.

End (*Resume reading on page 97*)

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25 Years

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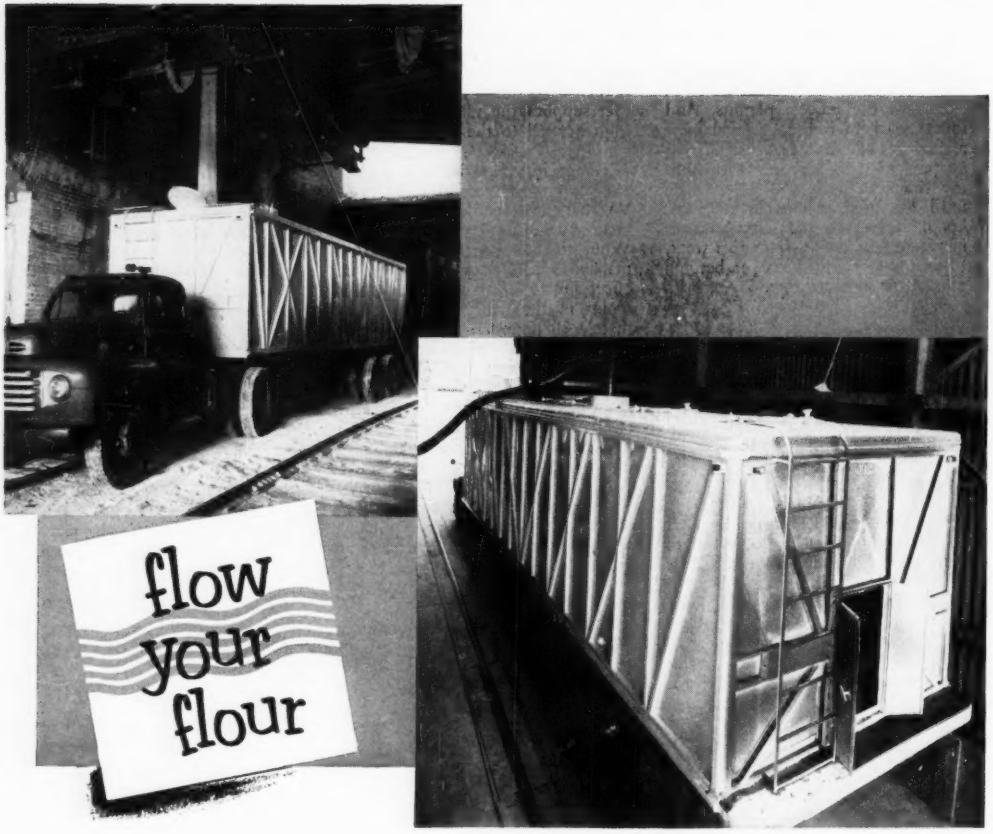

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With this hopper-bottom, tractor-trailer... jointly designed by the Gramm Trailer Corporation, Lima, Ohio, and Fuller and constructed in 1951... 20 tons of flour is quickly loaded, transported and automatically unloaded to storage. The travelling unit contains built-in Airslide® conveyors—plus complete equipment for either pressure or suction unloading and delivery by Fuller Airveyor® to storage bins.

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Centralized Lubrication

—Continued from page 77

contamination of the lubricant. Further, since valve bodies are of a selected size to fit each job, the amount of lubricant dispensed is always a uniformly needed quantity—the novel two-way seating construction preventing both excess or under-lubrication.

In the Corona plant, equipment layout dictated that seven series of valves be set up, and these are pressurized every 12 hr. at seven central stations. Thus, one man, wheeling the portable pump, can now service in less than 1 hr. equipment that formerly required a very full day of systematic hand lubrication.

While periodic lubrication was found suitable for roller bearings, a continuous system was desired for the many chain facilities and chain-drive operating equipment. To accomplish this the recently introduced "Oil Mist" system was specified. This employs a compressed air atomizer that supplies a fine spray of airborne lubricant over targeted moving parts.

Fully automatic, atomizer operates on 7 psi. air and is put into operation by a solenoid actuated by the subject machine's start-stop button. Consisting of a metal cylinder —mainly an oil reservoir—it is mounted adjacent to the lubrication site, along with air filter and pressure gage.

Compressed air is admitted through the solenoid into the unit, where it passes through a venturi and draws oil from the cylinders reservoir. This oil-air mixture is then atomized by impingement against a baffle. And the resultant vapor—as fine as cigarette smoke—is blown through delivery tubing leading to nozzles that are directed at lubricating target areas.

Atomized oil is drawn out of the air stream by moving machine parts. Obeying the gas laws, it will revert to fluid oil and accumulate on surfaces only in the presence of motion, such as occurs within a bearing, gear, or chain housing.

Coverage from a single atomizer is widespread. In the grading and washing operation, for example, one central "Oil Mist" assembly takes care of 20 chain drives.

Oil dispensed by this system is so finely dispersed that it is estimated proper lubrication is accomplished using as little as 10 percent of the lubricant formerly required. Also, because of this fine dispersion, it is stated that there is virtually no possibility of product contamination by the lubricant.

Sanitation and Economy

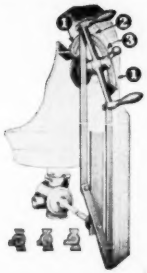
While rigid sanitation in process was primarily responsible for installation of the piped and systematic lubrication set-up, the resultant system has actually enhanced sanitation in the plant. Previously, a great deal of dripping due to over-lubrication and spillage between lubricating points made this type of contamination a hazard. But this situation has been completely remedied by the new system.

As stated, various operating economies have also come with the new system. Major saving, of course, is represented in the reduction of the considerable number of man-hours formerly devoted to lubricating the 4,500 points on a periodic basis. Also significant is the reduction in oil waste by metered distribution and freedom from spillage.

Since plant equipment in this process is relatively new, the company has not accumulated detailed information as to maintenance costs. However, it is anticipated that a regularly applied, uniformly distributed, constantly effective lubrication system of this type will increase the life of equipment and decrease maintenance costs.

End (Resume reading on page 78)

DON'T LOSE PROFIT DOWN THE SEWER!



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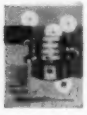
For more information, use post card on last page.

Meat Packing Plant * eliminates grinding room shut-downs with one 48" SWECO SEPARATOR

Limited space at this particular plant added to the problem of eliminating clogging of the meat scrap grinder. A 48-inch, single deck SWECO Separator with a ⅛-inch mesh screen was installed in a minimum space. It immediately took the bulk of the load off the grinder by removing fines after the crushing operation preventing them from reaching and clogging the grinder. Unit handles up to 10 tons per hour with complete efficiency. Both Standard and Custom-Engineered models available.

*Name on request.



Write for Fully Illustrated Catalog

S-6

SEPARATOR DIVISION
SOUTHWESTERN ENGINEERING COMPANY
SWECO 4800 Santa Fe Ave., Los Angeles 58, California

Recent Inventions

PRODUCTS

Fish Product Formed by Removing and Hydrogenating Taste-Imparting Fats and Oils Then Reblending Them With the Fish —*A. Osbourne, Cabin John, Md. No. 2,605,184. July 29, 1952.*

Butter and Margarine Made From Two Fluid Components, One with Fat and the Other the Dispersed Phase, by Adjusting Temperature Below Fat Solidification Point, Rapidly Mixing, Atomizing, Cooling—*S. H. B. Zachariassen, Stockholm, and A. C. Borck, Tullinge, Sweden, to Akteibolaget Separator, Stockholm, Sweden. No. 2,605,185. July 29, 1952.*

Food Composition Consisting of Frozen Plant Juice Concentrate and Gelling Agent Selected From the Irish Moss Gelose Extractives and Low-Methoxyl Pectins Group —*G. L. Baker, to Haskell Research Foundation, Newark, Del. No. 2,605,188. July 29, 1952.*

Water Dispersible Oxidized Starch Made by Periodic Reaction With Acid—*W. E. C. Yelland, Washington, D. C. to Lauhoff Grain Elevator Co., Danville, Ill. No. 2,606,188. Aug. 5, 1952.*

Coating for Bread Pan Consisting of Phenyl and Methyl Substituted Polysilane Resin—*H. A. Clark to Dow Corning Corp., Midland, Mich. No. 2,606,837. Aug. 12, 1952.*

Ice Cream Emulsifier Consisting of Diester of Polyethylene Glycol of Special Composition — *E. J. Valko, Mountain Lakes, N. J. to E. F. Drew & Co., New York City. No. 2,606,838. Aug. 12, 1952.*

PACKAGING

Cheese Package Employing Wrapping Material Which Retards Oxygen Entry But Permits Carbon Dioxide to Escape—*F. H. Cherepow and G. W. Forcey, Neenah, Wis. to Marathon Corp., Rothschild, Wis. No. 2,606,120. Aug. 5, 1952.*

Method of Making Package Consisting of Filled Inner Bag Cubicle With Outer Protecting Sleeve Around All But Two Sides—*O. H. Hultin to Pneumatic Scale Corp., Ltd., Quincy, Mass. No. 2,606,411. Aug. 12, 1952.*

Package Formed by Longitudinal Step-By-Step Sealing and Filling of Two Continuous Lavers of Material—*L. L. Salisberg, Orange, N. J. No. 2,606,412. Aug. 12, 1952.*

Method of Forming and Stuffing Food Package of Hydrophillic Cellulose Sheet Material and Heat-Pressure Polymerized Resin Sealer —*W. B. Kunz, Fredericksburg, Va. to American Viscose Corp., Wilmington, Del. No. 2,607,696. Aug. 19, 1952.*

PROCESSES

Accelerating Aging of Cheese by Subjecting to Carbon Arc Radiation — *F. H. Stark, Wauwatosa, Wis. No. 2,606,122. Aug. 5, 1952.*

Preserving Fresh Corn by Cutting Ends of Unhusked Ears, Roasting to Partially Dehydrate, Removing Husks, Freezing—*E. T. Boisvert, Wethersfield, Conn. No. 2,606,840. Aug. 12, 1952.*

Making Crystalline Dextrose by Ion Exchange Treatment, Decolorization, Concentration and Crystallization, Then Re-treating Mother Liquor With Fresh Starch for Conversion and Similar Refinement — *W. B. Newkirk, La Grange and A. D. Hapke, Bedford Park, Ill. to Corn Products Refining Co., New York City. No. 2,606,847. Aug. 12, 1952.*

Treating Succulent Vegetable Materials Containing Carotine by Contacting With Acid, Heating, Then Applying Pressure to Extract Juice—*D. D. Peebles, Hillsborough, P. D. Clary Jr., Petaluma, and R. K. Meade, Santa Rosa, Calif. to Western Condensing Co., San Francisco. No. 2,607,688. Aug. 19, 1952.*

Green Coffee Treated With Non-Toxic Oxygen-Carrying Porphyrin Solution and Roasting to Destroy Chlorogenic Acid and Trigonelline—*W. J. Hale, Midland, Mich. to Verdurin Co., Detroit. No. 2,607,689. Aug. 19, 1952.*

Preparing Green Coffee by Scarifying the Cherries and Treating With Pectic Enzyme — *W. R. Johnston, Bronxville, and H. E. Foote, Chappaqua, N. Y. to Standard Brands Inc., New York City. No. 2,607,690. Aug. 19, 1952.*

Edible Cereal Prepared by Adding Highly Viscous Sugar Solution Under Agitation, Heating, Adding Granulated Sugar, Cooling—*C. H. Bettman, Cedarhurst, N. Y. No. 2,607,691. Aug. 19, 1952.*

Preventing Decay in Citrus Fruits and Vegetables by Distributing Mold Inhibitor During Packing— *A. J. Rinck, Pomona Park, Fla. No. 2,607,694. Aug. 19, 1952.*

Purifying Lactalbumen by Removing Calcium and Magnesium With Acidified Water and Separating— *J. D. Ingle and R. T. Stahl to Swift & Co., Chicago. No. 2,607,766. Aug. 19, 1952.*

Extracting Vegetable Protein From Residue by Treating With

Calcium Chloride and Sodium Hydroxide, Separating Solids, Adding Mineral Acid, Separating Precipitated Proteinaceous Material—*B. Vassel, Toledo, Ohio to International Minerals & Chemical Corp., New York.* No. 2,607,767. Aug. 19, 1952.

Improved Wine Prepared by Adding Aqueous Extract of Gramineous Grass to Fermenting Mixture—*J. G. Brunier, Zaandam, Netherlands.* No. 2,608,484. Aug. 26, 1952.

EQUIPMENT

Apparatus for Forming Bread Dough by Passage Through Rollers Over Rotating Drum—*H. C. Rhodes, Portland, Ore. to Read Standard Corp.* No. 2,604,057. July 22, 1952.

Potato Brushing Machine Employing Plurality of Super-Imposed Tiers of Parallel Cylindrical Brush Members—*T. J. Lockwood, Gering, Neb.* No. 2,604,646. July 29, 1952.

Fish Skinning Machine Employing Reciprocating Cutting Knife Integrated With Feed Rollers for Moving Fillets Past Knife—*J. W. Daniels, Fort Meyers, Fla.* No. 2,605,495. Aug. 5, 1952.

Poultry Cleaning Machine Composed of Support for Body and Horizontally Movable Ram With Plurality of Extending Fingers—*W. F. Spang, Milton, Mass. to Cube Steak Machine Co., Boston.* No. 2,605,496. Aug. 5, 1952.

Apparatus for Distributing Moisture in Bread Consisting Essentially of Series of Rollers That Mould Dough into Elongated Sheet Which is Rolled—*H. C. Rhodes, Portland, Ore. to Read Standard Corp.* No. 2,605,722. Aug. 5, 1952.

Peach Pitting Machine Employing Pit Finder and Rotating Oscillating Knife—*L. W. Water, Ontario, Calif. to Atlas Imperial Diesel Engine Co., Oakland, Calif.* No. 2,605,796. Aug. 5, 1952.

Peanut Blanching Machine Utilizing Mechanical Skin Slitting Arrangement on Oriented Parallel Rows of Nuts—*P. G. Seabrook to J. W. Gardner, Tyrone, Pa.* No. 2,605,797. Aug. 5, 1952.

Fruit Peeler Employing Spaced Rollers With Abrading Surfaces and Helical Feeding Device—*A. A. Boswell to M. J. Boswell, Visalia, Calif.* No. 2,605,798. Aug. 5, 1952.

Control System for Retort Processing Including Automatic Venting Actuated by Temperature—*C. W. Sanders to Taylor Instrument Cos., Rochester, N. Y.* No. 2,695,969. Aug. 5, 1952.

Egg Grading Machine Employing Pneumatic Lifting Means Supported by Scale Balance Arms—*K. C. Powell to Chestnut Farms-Chevy Chase Dairy Co., Washington, D. C.* No. 2,606,658. Aug 12, 1952.

Poultry Feather Plucking Apparatus Employing Rotating Cylinder With Elastic Blanket Equipped With Feather Engaging Lugs—*G. W. Johnson, Raytown, Mo. to Gordon Johnson Co., Kansas City.* No. 2,607,072. Aug. 19, 1952.

Poultry Scalder With Jet Spray Heads So Placed That Birds are Rotated in Movement Through Machine—*G. W. Johnson, Raytown, Mo. to Gordon Johnson Co., Kansas City.* No. 2,607,073. Aug. 19, 1952.

Machine for Slitting Corn Kernels Employing Axially Spaced Concentric Disk Knives Working Against Kernel Orienting Roller—*W. J. Fitzpatrick to W. J. Fitzpatrick Co., Chicago.* No. 2,607,380. Aug. 19, 1952.

Continuous Chamber Cooker for Food In Containers Employing Superheated Steam and Agitation—*W. McK. Martin, San Mateo, Calif. to James Dole Engineering Co., Redwood City, Calif.* No. 2,607,698. Aug. 19, 1952.

Apparatus for Measuring Moisture Content of Material by Dielectric Variable—*J. Razek, Llanerch, Pa. to Chain Belt Co., Milwaukee, Wis.* No. 2,607,828. Aug. 19, 1952.

Pull-Rod Rotary Whole Citrus Juicer—*J. M. Hait, to Food Machinery & Chemical Corp., San Jose, Calif.* No. 2,608,152. Aug. 26, 1952.

Machine for Continuously Abrading Single Row of Citrus Fruits—*C. E. Fraser, Kew Gardens, N. Y. to Fraser-Brace Engineering Co., New York.* No. 2,608,226. Aug. 26, 1952.

Cabinet-Type Cereal Drier Employing Forced Hot Air Circulation With Automatic Process Termination and Removal of Dried Grain—*W. A. Noel, ⅓ to J. N. Joerger, ⅓ to Robert C. King, Washington, D. C.* No. 2,608,768. Sept. 2, 1952.

Machine for Forming Continuous Sheet of Plastic Dough—*J. F. Naylor, Newton-le-Willows, England to T. & T. Vicars, Ltd., Earlestown, Newton-le-Willows, England.* No. 2,608,939. Sept. 2, 1952.

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

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Wide Flexibility of Package Sizes

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Salad Company, for vegetable trimmings and inedible chicken parts

Potato Specialty Company, for peelings, rots, etc.

Fruit Juice Extractors, Fish Houses and others for bones, produce waste and food preparation waste

THE HERLEX AIDS SANITATION CONTROL by eliminating food waste in seconds as it occurs BEFORE it becomes a problem. No more need for expensive scavenger service. Designed for continuous operation—continuous feeding. Construction of wear-resistant non-corrosive aluminum alloy.

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* Names on request.

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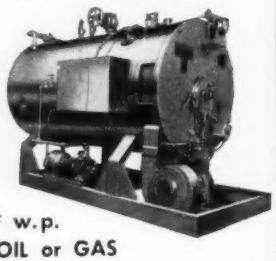

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Men & Companies

Dr. Carlyle G. Caldwell has been elected assistant vice-president of National Starch Products Inc.

Industry

American Institute of Baking has re-elected Louis E. Cast, chairman; Milton Petersen, vice-chairman; Howard O. Hunter, president; Joseph A. Lee, treasurer; and Paul Chapman, secretary.

Armour and Co. is currently building a packing plant in Waterbury, Conn. Cost: $500,000.

Babb Brothers Co. recently had its mill and storage building razed by fire. Damage: $75,000.

Big Creek Cannery, Merced, Calif., has been sold to the RFC for failing to pay off a government loan. Sale: $1,300,000.

Central Soya Co. has made directors of Wilbert E. Huge and John D. Shoaff.

First Spice Mixing Co., Inc., New York, is opening a branch factory in Toronto. Production is scheduled for early 1953.

General Mills, Inc., has authorized construction of a flour blending plant in Louisville, Ky.

Kraft Foods Co. has a warehouse and office under construction in Winnipeg, Manitoba. Cost: $150,000.

Lagendorf Bakeries, Inc., is operating a new plant in San Jose, Calif., with capacity of 100,000 loaves per day. Completed cost: $1,250,000.

John C. Mello & Son, Watsonville, Calif., had its apple drying plant wrecked by fire. Loss: $150,000.

Mid-West Produce Co. is now operating an albumen egg-drying plant in Winnipeg, Manitoba.

Paramount Nutrition Corp., San Francisco, has been incorporated to make and distribute a formula which introduces and dissolves vitamins C, D, and iron in milk and milk products. Capitalization: $1,000,000.

San Francisco Brewing Corp. is building a 5-story addition to its Burgermeister brewery. Cost: $2,500,000.

Seminole Flavor Co. plans construction of a plant in Chattanooga, Tenn., to make syrup concentrates. Cost: $504,000.

Todds Dairy is currently constructing a plant in Santa Ana, Calif.

Mrs. Tucker's Foods, subsidiary of Anderson, Clayton & Co., has completed a plant in Jacksonville, Ill., which will produce shortening, salad oil, margarine and products of a similar nature.

Personnel

Clark Abernethy, Toronto, has been elected Tea & Coffee Assn. president.

Neil L. Anderson is now manager of steelstrap department of the Acme Steel Co.

Solomon R. Baker, Worcester, Mass., was recently elected president of Pyrene Mfg. Co., Newark, N. J.

J. Lloyd Barron is newly-elected chairman of the Baking Industry Sanitation Standards Committee.

Charles J. Krueger has been appointed supervising engineer of Blatz Brewing Co., Milwaukee.

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It's good sense to wrap a product in foil—strong, pliable, attractive. Foods, drugs, chemicals, cosmetics—hundreds of items are kept safer, look better, sell faster in metal foil.

But metal foil by itself can't be heat-sealed. And it needs protection against abrasion, crinkling, split seams.

That's where a smooth, flexible, transparent coating based on VINYLITE Brand Resins helps metal foils. It heat-seals to form a strong, tight bond. It makes them tougher, stronger. It fills pinholes, gives surfaces a fine, clear gloss. Odorless, tasteless, non-contaminating, inert, it's an extra measure of safety.

Coatings based on VINYLITE Resins stick fast, stay flexible, won't crack or peel away—resist water, oils, greases, alkalies and most strong acids. They can be applied over printing or overprinted.

Similar coatings based on VINYLITE Brand Resins are available for other packaging materials, too—metal, paper, cloth. They have the qualities that make VINYLITE Brand Resins and Plastics so useful for scores of products throughout defense and basic industry.

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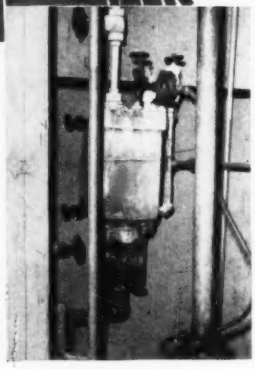

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Armstrong Purgers are Sold and Serviced by Factory Representatives and Refrigeration Supply Houses in all Major Cities.

Tate M. Robertson, Jr., is newly-appointed sales manager of corn products department for the Anheuser-Busch company.

M. R. Brice has been appointed manager of industrial control sales for Cutler-Hammer, Inc.

J. W. Broomhead was recently appointed plant manager of Continental Can Co.'s Pittsburgh container plant.

John L. Castleman has been named general manager of food processing division of Lang & Co., Seattle.

Norman J. Christie is now general sales manager for Best Foods (Canada) Ltd.

Bert Van Cleve is new general manager of Instant Beverage Co., San Francisco.

R. P. Davis was recently made president of the Vermont Dairy Plant Operators and Management Assn.

Sidney F. Davis has been appointed general sales manager and vice president of Owens-Illinois Glass Co.'s glass container division.

Dr. Robert B. Dean has joined Borden Co.'s chemical division in the post of chief analytical chemist.

Lester E. Demler has been promoted to manager of the chemical feeder department of Wallace & Tiernan Co., Inc.

W. J. DeWinter, export manager of Russell-Miller Milling Co., is now also a vice president.

A. M. Femrite is newly-elected president of North Dakota Dairy Industries. E. R. Woodcox was made a v.-p.

Max J. Gorby has been installed as president of California Fish Canners Assn., Inc.

J. George Kehr is now superintendent of all ten flour mills owned by Russell-Miller Milling Co.

William L. Killen has been named general manager of the Chicago steel tank division, Pressed Steel Car Co.

J. U. Lemmon, Jr., was recently re-elected president of the Bakery Equipment Manufacturers Assn. Re-elected v.-p. was John E. Morrill.

James Dewey Long, agricultural engineer, is now a technologist for the Armour Research Foundation. He will be assigned to a Point IV project in India sponsored by the government.

F. P. Murken is now manager of industrial hose division, Quaker Rubber Corp., division of H. K. Porter Co., Inc., Philadelphia.

Donald F. Murphy is newly-elected vice-president of Rohm & Haas Co.

Dr. Lewis H. Rogers has been appointed head of analytical chemistry division of National Dairy Research Laboratories, Inc., Oakdale, Long Island.

Ralph C. Russell, packaging figure, is now executive vice-president of Fairbairn Tape & Label Co., Inc.

Forbes A. Ryder has been named national sales manager for bottling division of Dad's Root Beer Co., Chicago.

G. R. Schermerhorn succeeds L. G. Tuttle as general manager of Clapp's Baby Food Div. of American Home Foods Inc., Rochester, N. Y.

George F. Schmidt succeeds late J. Fred Schmidt, Jr., as vice-president. Grover Schmidt has been made a director and George L. Schmidt continues as president and general manager.

Orville K. Schmied is appointed general manager of consumer goods division for Cochran Foil Products Co.

Robert J. Schoettler is new chairman of Pacific Marine Fisheries Commission.

Dr. Max Y. Seaton is now senior vice-president and technical coordinator of chemical divisions for Food Machinery & Chemical Corp.

Emil G. Sick has been named chairman of Sicks' Seattle Brewing & Malting Co. and Sicks' Spokane Brewery, Inc.

George E. Van Sise has been given manager-of-distribution position for General Foods.

O. E. Snider of Blue Lake

Packers, Inc., Salem, Ore., is now also board member of National Assn. of Frozen Food Packers.

Charles A. Specht has been elected president of all foreign subsidiaries of Chas. Pfizer & Co.

V. J. Vieira is new president of the Western Dairymen's Assn.

A. O. Williams is appointed director of engineering, industrial truck division, Clark Equipment Co.

Kenneth B. Willson was recently made president of National Better Business Bureau. Allan E. Backman is executive vice-president.

Ray L. Woerner has been elected vice-president and general manager of Felber Biscuit Co.

Carl A. Wood, president of Dairy Industries Supply Assn., will be chairman of 1953 June Dairy Month campaign.

Associated Industry

B&W Canning Co. aims to increase frozen concentrate capacity and refrigerated storage space. Cost: $1,000,000.

Beckman Instruments, Inc., plans building a new plant and has succeeded in raising working capital. Amount: $2,500,000.

Carter Controls, Inc., formed to make hydraulic and pneumatic equipment, will be headed by J. Carter Miller.

Cochran Foil Co., Louisville, has let a contract to the Austin Co., Cleveland, to erect an aluminum foil processing plant.

Continental Can Co.'s paper container division has promoted J. Jennings to assistant vice-president and made J. Taylor manager of the division.

Food Machinery & Chemical Corp.'s Australian subsidiary, Austral Otis Engineering Co. Ltd., has changed its name to Food Machinery (Australia) Ltd.

Jones & Laughlin Steel Corp. announces retirement of H. W. Lees as sales director of its container division and names as his successor, K. Lyons.

Arthur D. Little, Inc., industrial consulting research firm, has established an international division.

E. T. Oakes Corp., Islip, Long Island, announces it will henceforth exclusively make and distribute its continuous automatic mixer and other machines.

Potter Engineering Co., Newark, has made Jack Meyer manager of advertising and sales promotion.

Sutherland Paper Co. is locating field service engineers at key points throughout the country: N. C., N. Y., Mo., Ohio, and Ill.

R. D. Krier, Belgium, Wis., was recently elected president of Wisconsin Canners Assn.

Deaths

Joseph A. Biedenharn, 85, reputed as first man to bottle Coca-Cola,—Oct. 9.

Edward F. Carlson, 57, assistant vice-president of Red Star Yeast & Products Co.—Sept. 29.

Carl J. Eastman, 65, former Leslie Salt Co. executive, San Francisco.—Oct. 5.

James McWilliams Lemon, 61, fishery technologist for U. S. Fish & Wild Life Service.—Oct. 15.

Paul F. O'Neil, 61, one of three founders of American Cracker Co.—Oct. 21.

Edward Comens Osgood, 94, inventor of electrical and mechanical devices including first reputed machine successfully to cut whole grain corn from cob for canning.—Nov. 1.

S. M. Reeves, 64, president of Van Dyk & Reeves, Inc., Brooklyn food packer.—Nov. 8.

Frank R. Shepard, 84, cofounder and retired vice-president of General Baking Co., Mass.—Oct. 7.

John H. Ziegler, founder and senior partner of Westco Products, Los Angeles bakery supply company.—Oct. 20.

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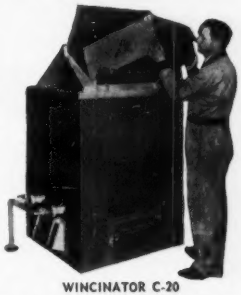

WINCINATOR C-20

The Winnen Commercial Incinerator saves more than its cost in refuse hauling charges within six to twelve months, according to hundreds of satisfied users. It completely consumes up to 400 lbs. per hour of half wet and half dry refuse. A smaller, identical model consumes 100 lbs. per hour. Combustion is so complete there is usually less than a bushel of fine, white ash after a week of normal operation.

Ideal for use in or near residential areas, practically all smoke and odors are eliminated through forced draft, a special ventilating system and secondary combustion. A hot, intense flame is delivered by twin burners using natural, manufactured, bottled gas or oil. Operating costs are amazingly low. Available without any burners for dry refuse, only.

Designed for installation either indoors or out, this incinerator is absolutely safe. It is easily loaded and fired and can be left unattended during day or night. Virtually foolproof, the Winnen Incinerator comes completely equipped with the latest safety devices. Available with automatic timer to control fuel shut-off at pre-selected times, as well as prefab chimney, if required.

Winnen Incinerators are shipped complete, knocked down, direct from factory within ten days of receipt of order. Complete, easy-to-follow instructions for assembling and installing are furnished and any qualified maintenance man can have a Winnen Incinerator ready to operate within a day or less. Installation does not require a mason or furnace man. Materials and workmanship are fully guaranteed for 90 days.

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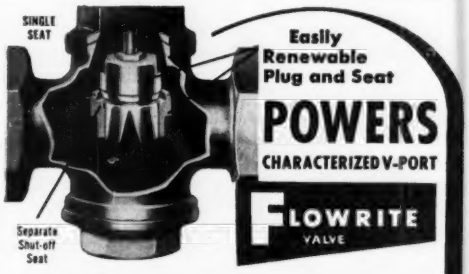

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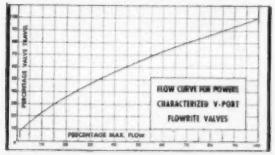

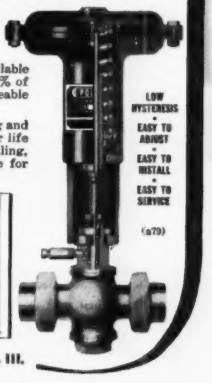

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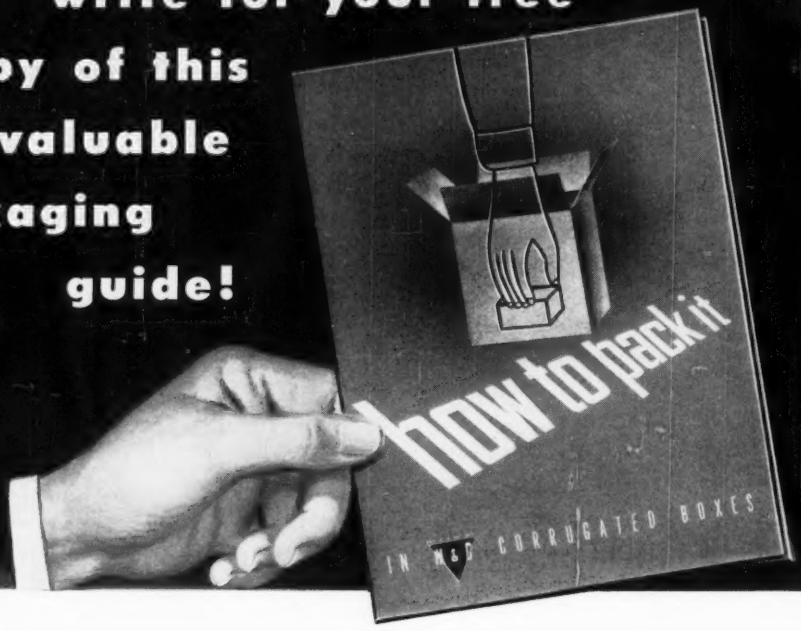

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Binfeed Stokers

Many types of binfeed stokers are given in bulletin also featuring excellent layout of boiler room. 8 pages.—*Canton Stoker Corp., Andrew Pl. S. W., Canton, Ohio.*

Circle L209A on Reader Service Card

Refrigeration Machinery

Broad line of refrigeration machinery is given in Bulletin 402. Air cooling units are included. 4 pages.—*Frick Co., Waynesboro, Pa.*

Circle L209B on Reader Service Card

Vacuum Systems

Complete Vacuum Processing Systems is title of catalog picturing rotary and rotating vacuum dryers, vacuum shelf dryers, impregnators, and other apparatus. 12 pages.—*F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20.*

Circle L209C on Reader Service Card

Radial Air Compressors

Two-stage, air-cooled radial air compressors capable of producing 80 to 125 lb. pressure are described in Bulletin H-630-B1. 12 pages.—*Worthington Corp., Harrison, N. J.*

Circle L209D on Reader Service Card

Speed Reducers

Shaft-mounted speed reducers with speeds from 12 to 330 rpm. and capacities of 1 to 43 hp. are presented in Bulletin A-614-A. 20 pages.—*Dodge Mfg. Corp., Mishawaka, Ind.*

Circle L209E on Reader Service Card

Bag Packers

Leaflet of use to distributors and plant men describes Model 1-5 bag packers designed to fill valve bags with variety of granulated or powdered materials.—*H. L. Stoker Co., 111 S. College Ave., Claremont, Calif.*

Circle L209F on Reader Service Card

Starch Conditioners

Units—dryers and coolers—employed in starch conditioning are revealed in booklet *Continuous Starch Conditioning Systems.* 32 pages.—*A. Huhn Mfg. Co., 3915 Hiawatha Ave., Minneapolis 6.*

Circle L209G on Reader Service Card

High Pressure Pumps

Bulletin 295 gives dimensions, capacities, and cutaway drawings on pumps from 600 to 5,000 psi. or 1.1 to 16.5 gpm. 6 pages.—*American-Marsh Pumps, Inc., Battle Creek, Mich.*

Circle L209H on Reader Service Card

Air Conditioning Systems

Specification sheet describes two packaged air conditioning systems of 10- and 15.5-ton capacities, respectively.—*Worthington Corp., Harrison, N. J.*

Circle L209I on Reader Service Card

Heat Assemblies

Tunnel burners and sealed-in gas burner nozzles are topics of Catalog 807. 4 pages.—*Hauck Mfg. Co., 124-136 10th St., Brooklyn 15.*

Circle L209J on Reader Service Card

Open-Flow Nozzles

Pertinent data on accuracy, construction, dimensions, installation, and capacities of open-flow nozzles is function of Bulletin 135-J5. 8 pages.—*Builders-Providence, Inc., Providence, R. I.*

Circle L209K on Reader Service Card

Roller Gear Drives

Line of roller gear drives for automatic machinery in the canning industry is feature of Bulletin 101. 4 pages.—*Ferguson Machine & Tool Co., Inc., 471 Paul Ave., St. Louis 21.*

Circle L209L on Reader Service Card

Motors, Drives, Etc.

Varied units—ac and dc motors, adjustable-speed drives, generators, and electronic controls and regulators—are presented in Bulletin A-2703. 4 pages.—*Reliance Electric & Engineering Co., 1676 Ivanhoe Rd., Cleveland 10.*

Circle L209M on Reader Service Card

Versatile Pumps

Air-operated pumps — claimed highly versatile—are featured with graphs and illustrations in recent bulletin. 4 pages.—*Alemite Div. of Stewart-Warner Corp., Chicago.*

Circle L209N on Reader Service Card

Square-Type Boilers

Series of square-type boilers for oil, gas, or stoker firing is discussed in Bulletin 88. 4 pages.—*Kewanee-Ross Corp., Kewanee, Ill.*

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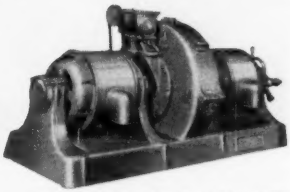
Proportioning Pump

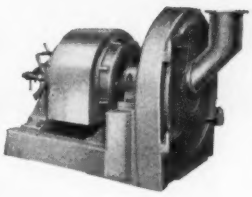
Chemical proportioning pump claimed to have all-purpose utility

MOST COMPLETE LINE AVAILABLE

Bauer ATTRITION MILLS



Bauer Double Revolving Disc Attrition Mill. Two built-in motors or sheaves for belt drive. 30 to 600 hp.



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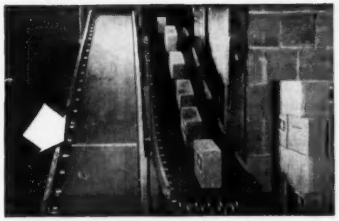

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Croloy 18-8 Si	302B
Croloy 18-8 F-M	303
Croloy 18-8 S	304
Croloy 18-12	305
Croloy 20-10	308
Croloy 25-12	309
Croloy 25-12 Cb	...
Croloy 25-20	310
Croloy 16-13-3	316
Croloy 16-13-3 Cb	...
Croloy 18-13-3	317
Croloy 18-8 Ti	321
Croloy 18-8 Cb	347
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Croloy 12-2	414
Croloy 12 Al	405
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B&W SEAMLESS and WELDED TUBES

is noted, with accessories, in Catalog 1225. 8 pages.—*Proportioneers, Inc., Box 1442, Providence 1.*

Circle L209P on Reader Service Card

Centrifugal Pumps

Graphs and illustrative data are given on centrifugal pumps claimed to be self-lubricating with no mechanical seals. 12 pages.—*Chempump Corp., 1300 E. Mermaid Lane, Philadelphia 18.*

Circle L211A on Reader Service Card

Flotation Agitator

Leaflet A2-B3 describes units instrumental in flotation engineering via agitator and conditioner.—*Denver Equipment Co., 1400 17th St., Denver.*

Circle L211B on Reader Service Card

Control Equipment

Weight Balance

Single pan, direct reading, plus rapid, accurate weighings are some of advantages listed in booklet describing weight balance. 8 pages.—*Fisher Scientific Co., 717 Forbes St., Pittsburgh 19.*

Circle L211C on Reader Service Card

Program Controllers

Electronic cam-operated program controllers are covered in Bulletin 1502. 8 pages.—*Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Wayne & Windrim Aves., Philadelphia 44.*

Circle L211D on Reader Service Card

Carrier Amplifier

Bulletin 1522A correlates profuse data on carrier amplifier designed for smaller engineering and development laboratory. 6 pages.—*Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 8, Calif.*

Circle L211E on Reader Service Card

Level Indicator

Materials level indicator for use with dry, bulk matter of all consistencies is revealed in recent bulletin. 4 pages.—*Convair, Pittsburgh.*

Circle L211F on Reader Service Card

Axle-Load Scales

Ball-bearing, axle-load scales for checking weights on each axle of motor trucks and trailers are offered in Bulletin 682. 8 pages.—*Howe Scale Co., Rutland, Vt.*

Circle L211G on Reader Service Card

Flexible Tapes, Bands

Leaflet devulges specifications and advantages of flexible heating tapes and bands.—*Scientific Glass Apparatus Co., Inc., Bloomfield, N. J.*

Circle L211H on Reader Service Card

Anent Air, Reefer Units

Expanded Catalog 53R points to line of general controls applicable to air conditioning and refrigeration. 28 pages.—*General Controls, Skokie, Ill.*

Circle L211I on Reader Service Card

Temperature Control Device

Leaflet discussing range, setting, accuracy, and other data on resistance, bulb-type, signaling temperature controller is now available.—*Thermo Electric Co., Inc., Fair Lawn, N. J.*

Circle L211J on Reader Service Card

Vibration Meter

Compact vibration meter giving direct reading of both linear and torsional velocity and displacement is topic of Bulletin 1505B. 4 pages.—*Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 8, Calif.*

Circle L211K on Reader Service Card

Variable Indicator

Electronic, automatic control of process variables are promised via use of instruments described in Bulletin A-702. 6 pages.—*Swartwout Co., 18511 Euclid Ave., Cleveland 12.*

Circle L211L on Reader Service Card

Portable Tachometers

Compiled data of Leaflet 48HJK cites accuracy and convenience in presenting portable tachometers for precise speed measurements.—*Metron Instrument Co., 432 Lincoln St., Denver 9.*

Circle L211M on Reader Service Card

Control Valves

New Techniques in Control Valve Design is title of bulletin describing current and projected trends in their use. 16 pages.—*Conoflow Corp., 2100 Arch St., Philadelphia 3.*

Circle L211N on Reader Service Card

Air, Refrigerator Controls

Line of automatic controls for air conditioning and refrigeration is given thorough coverage in Bulletin 1487W. 20 pages.—*Penn Electric Switch Co., Goshen, Ind.*

Circle L2110 on Reader Service Card

Miniature Recorders

Bulletin A-704 contains photos, diagrams, and sketches advancing usefulness of miniature all-electronic recorders. 6 pages.—*Swartwout Co., 18511 Euclid Ave., Cleveland 12.*

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"Freon"-charged units protect sugar cookies from storage to shipping!

...air conditioning maintains exacting controls in western bakery

National Biscuit Co.'s modern plant, located in Portland, Oregon, insures superior air conditioning and refrigeration with "Freon"-operated York equipment. These units prevent spoilage and maintain exacting controls through every step of cookie and cracker production.

Surmounting the main bakery structure is a striking 201-foot tower, completely air conditioned to protect many ingredients. Here, thermostatically set controls insure constant temperature of 75°F. to 80°F.—ideal storage conditions for the raw materials kept in this tower.

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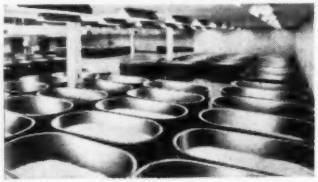
After cookies are baked, proper cooling systems permit easy packaging at the right temperature. Thus at every step—from raw materials to final packaging—goodness and freshness are fully protected.



"Proof" room, where cookies are carefully tested for absolute quality and purity. In this critical process, "Freon"-operated air conditioning and refrigeration provide ideal temperature and humidity control.

Whether it's baked or canned goods, meats, or quick-frozen foods ... processors, shippers and retailers throughout the food industry heartily approve "Freon" refrigerants. They're safe ... nonflammable, nonexplosive, virtually nontoxic ... provide efficient, economical refrigeration for every type of food product.

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150th Anniversary

BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

ardized steel laboratory furniture available from stock are subject of Catalog 25. 28 pages.—*Fisher Scientific Co., 7722 Woodbury Dr., Silver Spring, Md.*

Circle L211Q on Reader Service Card

Re Doughnut Making

Vol. 22, No. 1 of *Laboratory* points to correlation of laboratory techniques and doughnut manufacture. 40 pages.—*Fisher Scientific Co., 633 Greenwich St., N. Y.*

Circle L213A on Reader Service Card

Pressure Transmitter

Specifications and typical installations are given in bulletin describing pressure transmitter for measuring fluids. 4 pages.—*King Engineering Corp., Ann Arbor, Mich.*

Circle L213B on Reader Service Card

Materials Handling

Conveyors, Hand Trucks

Devoted almost exclusively to variety of conveyors for many tasks, bulletin also includes data on hand trucks and accessories. 6 pages. — *Arrow Products Inc., Grand Rapids 4, Mich.*

Circle L213C on Reader Service Card

Hydraulic Dumper

Capacities ranging to 100,000 lb. is one advantage cited in bulletin describing hydraulic dumper handling all truck and tractor sizes. 4 pages.—*Kewanee Machinery & Conveyor Co., Kewanee, Ill.*

Circle L213D on Reader Service Card

Anent Conveyors

Gravity and powered conveyors with brief descriptive data on hand trucks are topics of lengthy bulletin. 28 pages.—*Rapids-Standard Co., Inc., Grand Rapids 2, Mich.*

Circle L213E on Reader Service Card

Storage Shelves

Benefits of rotary shelving for store parts, tools and materials in plant tool or supply rooms are discussed in Catalog 110 on storage shelves. 16 pages.—*Frick-Gallagher Mfg. Co., Wellston, Ohio.*

Circle L213F on Reader Service Card

Bag Handlers

Flattener, pallet loader, and elevator for handling bags are treated illustratively in Bulletin 60. 4 pages. — *Power-Curve Conveyor Co., Box 1146, Denver.*

Circle L213G on Reader Service Card

Link Belting

Booklet 205 gives selection table with power correction factors, installation and maintenance instructions in describing link belting.—*Brammer Corp., 684 Broadway, New York.*

Circle L213H on Reader Service Card

Woven-Wire Belts

Bulletin 107 notes uses of woven-wire conveyor belts and gives different types available. 4 pages.—*Cambridge Wire Cloth Co., Cambridge, Md.*

Circle L213I on Reader Service Card

Loading Ramp

Portable loading ramp hydraulically or manually operated is given, with specifications, in new bulletin. 4 pages.—*John B. Illo, 2414 E. 57th St., Los Angeles 58.*

Circle L213J on Reader Service Card

Bag Holders

Four types of bag holders are presented in Bulletin 0452 with applications outlined. 6 pages.—*Richardson Scale Co., Clifton, N. J.*

Circle L213K on Reader Service Card

Plant Supplies

Gun and Detergent

Cleaning via steam-gun and special detergent is topic of new booklet. No motors, injectors, or pumps are needed for gun, states maker.—*Oakite Products, Inc., 19 Rector St., New York 6.*

Circle L213L on Reader Service Card

Steel Heads

Flanged and dished heads for end-enclosures of pressure vessels such as tanks and boilers are bulletin's subject. 4 pages.—*Joseph T. Ryerson & Son, Inc., Chicago 80, Ill.*

Circle L213M on Reader Service Card

Silicone Notebook

Discussion of particular silicone takes place in Bulletin 2003. Many uses outlined, from polish ingredient to paint additive. 32 pages.—*Dow Corning Corp., Midland, Mich.*

Circle L213N on Reader Service Card

Hard-Facing Alloys

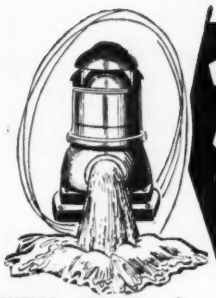
Manual 77 charts advantages of hard-facing alloys in relation to abrasion, corrosion, impact, and heat. 12 pages.—*Wall Colmonoy Corp., 19345 John R St., Detroit 3.*

Circle L213O on Reader Service Card

Pipelines, Fittings

Cleaned-in-place sanitary stainless steel pipelines are presented with specifications in Bulletin G-470. 4 pages.—*Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6.*

Circle L213P on Reader Service Card



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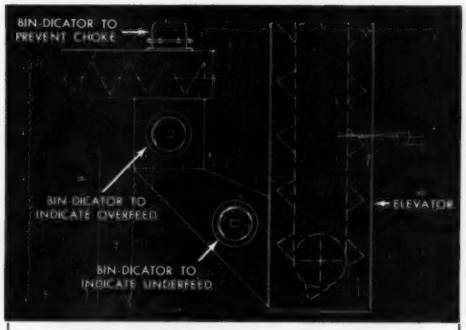

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150 lbs. Steam
200 lbs. O.W.G.

Take a Jenkins Fig. 106-A apart. It's easy to see why it is industry's all-time favorite. Note the liberal dimensions of body and bonnet casting — the heavy, manganese bronze spindle, with more strong threads in contact with the bonnet, regardless of spindle position. See how the slip-on, stay-on disc holder fully protects the edge of the disc, prevents creeping, flaking, or cracking.

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Fig. 106-A not only looks better — it proves out better in performance. In any comparison, its long life, low upkeep record has never been surpassed. That is the true measure of valve cost — and it is the reason why industry's shrewdest buyers will settle for nothing less than Fig. 106-A quality.

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LOOK FOR THE DIAMOND MARK

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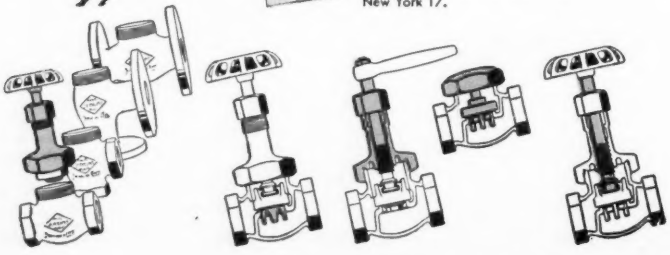

Fig. 106-A "Family" interchangeability meets 90% of your valve needs with a small inventory of parts. Start with the standard Fig. 106-A. Trimming is interchangeable in Globe or Angle body, screwed or flanged. With a few parts, quickly-assembled combinations provide a Lift Check, a Spring-loaded Check, and valves for Stop and Check, Quick-opening, or Throttling service.

Lubrication Manual

Volume 38, No. 8 of *Lubrication* gives pertinent data on fuels and lubricants for trucks of all types. 16 pages.—*Texas Co., 135 E. 42nd St., New York 17.*

Circle L215A on Reader Service Card

Surface Protectors

Number of materials for protecting surfaces of many types from deteriorating elements are covered in lengthy bulletin. 48 pages.—*Stonehard Co., 1306 Spring Garden St., Philadelphia 23.*

Circle L215B on Reader Service Card

Metals and Alloys

Physical properties of certain alloys and relative use of metals in bearings, gears, cams, dies, wear strips and other units, are detailed in Bulletin G-1. 4 pages.—*Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 46.*

Circle L215C on Reader Service Card

Resin Adhesives

Development, preparation, and advantages of resin-emulsion adhesives are presented non-technically in new brochure. 6 pages.—*Paisley Products, Inc., 1770 Canalport Ave., Chicago 16.*

Circle L215D on Reader Service Card

Cork Products

Natural cork products are presented in bulletin with information on density, tensile strength, and other characteristics. 4 pages.—*Dodge Cork Co., Inc., Lancaster, Pa.*

Circle L215E on Reader Service Card

Lightweight Steel

Processing and heat treating light-steel equipment — retorts, tubes, piping, vessels, rings—are discussed in Catalog 52. 24 pages.—*Pressed Steel Co., Wilkes-Barre, Pa.*

Circle L215F on Reader Service Card

Re No-Flux Alloy

Metals and chemicals combine to make no-flux alloy which, reports leaflet, permits welding without soldering or brazing, or with fusion utilizing capillary action.—*Chemalloy Assoc. Santee, Calif.*

Circle L215G on Reader Service Card

Insulation Material

Data on low-temperature insulation material is advanced in catalog citing uses, advantages, and applications. 24 pages.—*Plastics Dept., Dow Chemical Co., Midland, Mich.*

Circle L215H on Reader Service Card

Miscellaneous

Speaking System

Two-way speaking system with shielded cable installed on job is topic of leaflet.—*Magic Voice Mfg. Co., 1336 Fulton St., Brooklyn 16.*

Circle L215I on Reader Service Card

Reference Records

Adaptability and compactness are asserted in use of reference records outlined in Booklet KD574. 8 pages.—*Remington Rand Inc., 315 Fourth Ave., New York 10.*

Circle L215J on Reader Service Card

Black Pigments

Vol. 2, No. 6 of *Carbon Black Pigments* discusses extensive uses of same. Engineered to fill technical demand, states maker. 16 pages.—*Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10.*

Circle L215K on Reader Service Card

Insecticide Unit

Machine dispensing insecticide in form of dry fog without danger to food is subject of small folder. 4 pages.—*Aero-Sanitation Co., 111 W. Pacific Ave., St. Louis 19.*

Circle L215L on Reader Service Card

Nickel, Alloys

Corrosion Resistance of Nickel and High-Nickel Alloys in Food Processing is title of work touching upon foods such as salt, brines, sugar, fruits, juices, vanilla, cereals, meat, flour, coffee, butter, oleo, sea foods and others. 36 pages.—*International Nickel Co., Inc., 67 Wall St., New York 5.*

Circle L215M on Reader Service Card

Eye-Care Manual

Accidents impairing eyes and their prevention are detailed in recent, colorful manual. 24 pages.—*Bausch & Lomb Optical Co., Rochester 2, N. Y.*

Circle L215N on Reader Service Card

Expediting Mail

Methods by which mail may be handled quickly in office or plant—with related equipment—comprise subject of informative catalog.—*Pitney-Bowes, Inc., Walnut & Pacific Sts., Stamford, Conn.*

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Food Plant Consultants
PLANT SANITATION—MANDATORY LABELING
LABORATORY SERVICES; Filth in foods, food analysis, bacteriological tests.
817 Moody Street Waltham 54, Mass.

FOOD DEVELOPMENT LABORATORY
Consulting Service
S. W. ARENSON, DIRECTOR
Service to the Baking and Potato Chip Industries
Baking, Frying, Chemical, Physical
Product Development Formulation Quality Control
1403 Eutaw Place 1133 Broadway
Baltimore, Md. New York, N. Y.

LEWIN ASSOCIATES
Industrial Consultants
DAVID N. LEWIN, Ph.D., FOOD CONSULTANT
JOSEPH D. LEWIN, CONSULTING ENGINEER
Design — Layouts — Investigations — Consultations—Reports—Market Investigations—Bakeries, Dairy Products—Food Preserving by Heat, Drying, Freezing—Consultation in Managing, Warehousing, Distribution—Formulae, New Products.
8 West 47 St., N. Y. C., N. Y. JUdson 6-1748

KARL B. NORTON & ASSOCIATES
Successors to
DONALD K. TRESSLER & ASSOC.
Food Technologists and Engineers
Specialists in Food Preparation and Preservation; Equipment Testing and Evaluation; Food Freezing; By-Product Utilization; Manufacture of Pure Fruit Flavors.
North Compo Road Westport, Conn.

GUSTAVE T. REICH
Consulting Chemical Engineer
Continuous Processes Sugar
Complete Plants Yeast, Molasses
Alcohol - Dry Ice - Waste
1422 Chestnut St. Philadelphia 2, Pa.

SCHWARZ LABORATORIES, Inc.
Consultation on Food Problems
Analyses of Foods and Beverages
Food Plant Design and Process Improvement
Research and Investigations
Legal Testimony
Write for bulletin describing facilities and services
230 Washington St., Mount Vernon, N. Y.

FOSTER D. SNELL, INC.
Research Chemists and Engineers
Organoleptic Panel Testing, Formulation and Stability; Protective Packaging.
Inquiries invited on food research problems.
(Official Laboratory Association of Food Distributors, Inc.)
29 West 15th Street New York 11, N. Y.
WA 4-8800

STRASBURGER & SIEGEL
Chemists - Bacteriologists — Food Technologists
Specialists in Canned and Glassed Foods Laboratory Services
Testing Tomato Products, Mayonnaise, Pickles, Oils, Fats, Beverages, Sugars, Filth in Foods, Food and Drug Libels, Expert Testimony
1403 Eutaw Place Baltimore 17, Maryland

Ingredients
For the Food Processor

WHERE TO STORE FROZEN FOODS

CARROT OIL makes foods golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.
Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET
New 36-page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

NUTRITIONAL RESEARCH ASSOCIATES
205 Broad St., South Whitley, Ind.

QUAKER CITY COLD STORAGE CO., Inc.
PHILADELPHIA, PA.
3 WAREHOUSE LOCATIONS
Proper Temperature for Frozen Foods

New Advertisements

received by December 23rd will appear in the January issue subject to limitation of space available. Address copy to the

FOOD ENGINEERING
330 W. 42nd St., New York 36, N. Y.

the advertisements in the SEARCHLIGHT SECTION on the following pages

are live opportunities in the field of food processing and distribution.

Each announcement represents a current Want or Offering of an organization or individual in the field, with some element of profit in each for whoever can fill the need. Some have money-saving possibilities, others are opportunities for more business; many are employment opportunities; still others offer property, or equipment—used or surplus new equipment.

"Searchlight" advertisements are constantly changing. New opportunities are constantly finding their way into this great Want medium, each issue. Regular reading of the "Searchlight" pages can be as important to you as reading the editorial sections; Editorial matter is NEWS OF OPPORTUNITIES offered in the industry.

for EVERY business WANT
"Think SEARCHLIGHT first"

DELIVERY — vs — DELAY

When knowing where to find what you need is the deciding factor between DELIVERY and DELAY . . . consult the advertising pages of this publication. If the advertisements do not tell where to find what you need . . . write

FOOD INDUSTRIES

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

$1.20 a Line—Minimum 3 Lines.
To figure advance payment count 5 average words as a line.
POSITION WANTED & INDIVIDUAL SELLING OPPORTUNITY undisplayed advertising rate is one-half of above rate, payable in advance.
PROPOSALS, $1.20 a line an insertion.

INFORMATION:

BOX NUMBERS count as one additional line.
DISCOUNT of 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals).
EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

DISPLAYED RATE:

The advertising rate is $11.50 per inch for all advertising appearing on other than a contract basis. Contract rates on request.
AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS Address New York Office, 330 W. 42nd St., New York 36, N. Y., for the January Issue closing December 23rd

PLANT ENGINEER

Permanent position with substantial firm for mechanical engineer or qualified master mechanic having extensive food plant production and packaging equipment experience as plant engineer or similar. Must be able to plan, organize and effectively direct work on utilities, maintenance and machine development. Reply in confidence giving full salary and responsibility backgrounds.

P-6126, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

ASSIST. FOOD PLANT MGR.

Excellent future for aggressive man, experienced in supervision of multi-department food operation. Not an office planning job, but one requiring constant floor co-ordination. Must have stature and ability to control able department heads. Give full salary history in confidence.

P-6119, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

(Additional Position Vacant Ad on the following page.)

COLGATE-PALMOLIVE-Peet Co. The opportunity to join our engineering staff is now open to men with the following qualifications. Job Engineer, Graduate mechanical engineer with 8 to 10 years experience in design and development of automotive packaging machinery. Design Draftsmen, Experienced designer, graduate or non-graduate with background of 7 to 12 years in automatic machine design and equipment layout. Jr. Mechanical Engineer, Young college graduate with 1 to 3 years experience in automatic machine design and development. Each is a career position with every opportunity for professional advancement. If you have experience and education in this field, send a complete resume to: Personnel Department, 105 Hudson St., Jersey City, N. J.

WANTED: DAIRY Chemist, graduate degree, background physical and biological chemistry, for research and development work with expanding milk processor. Must have initiative to assist in planning and organizing his own work. Industrial experience helpful but not required. In reply describe education, experience, state age and salary requirement. P-5659, Food Engineering.

SELLING OPPORTUNITY OFFERED

SALESMEN WITH grounding in Ice Cream industry to sell complete line of supplies and equipment for manufacturer of frozen novelties. Original, exclusive products, live leads furnished, liberal commission program, nationally advertised firm. Highly lucrative opportunity. SW-5897, Food Engineering.

EMPLOYMENT SERVICE

SALARIED PERSONNEL. $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

FOOD TECHNICIAN, most qualified frozen foods manufacturing field with good record in product development work of speciality lines desires opportunities changes in position. Quality control and method improvement assignments preferred. PW-5853, Food Engineering.

PACKAGING DEPT. MANAGER

WANTED: A cost minded supervisor of diversified hand and machine food packaging operation, able to train help, institute labor saving methods and supervise constantly on the floor. Offered: A job with unlimited future in aggressive organization. Reply in confidence giving salaries earned.

P-6122, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

CHEMISTS—ENGINEERS

An active, confidential service! Interview at your convenience.

Call, write or wire:
Gladys Hunting (Consultant)
Drake Personnel, Inc.
7 W. Madison St. Chicago 2, Ill.

POSITIONS WANTED

PLANT MANAGER, 20 years experience manufacturing high quality Preserves, Jellies, Syrups, Mayonnaise, Sauces, Canned Soups, Meats, Poultry, Fruits, Vegetables etc. 15 years in managerial capacities. Experienced in Lay-out, Purchasing, Supervision, Costs, Quality Control, Selling and Army Contracting. Age 43. Prefer West Coast. PW-6033, Food Engineering.

SELLING OPPORTUNITY WANTED

SALESMAN COVERING Missouri and Kansas seeks product of merit to represent that area. P.O. Box 825, Minneapolis 1, Minn.

IMPORTANT FRENCH Company specialist in food machinery and equipment manufacturing with large possibilities in production and sales, would be interested by exclusive licenses of new machines or equipments in food industries for France and European countries. Address S.E.I.L.A. 16, rue Chauveau Lagarde-Paris (8) France.

WE WANT products to sell for responsible firms. Two experienced salesmen with established following, regular coverage N.Y. Metropolitan area, Conn. & N.J. Finished products or raw materials for ice cream, baking, confectionery, flavors, and allied food trades. RA-6148, Food Engineering.

DO YOU NEED TOP LEVEL REPRESENTATION IN THE WEST

We are now contacting top management, executive engineers and purchasing agents of oil refineries, chemical manufacturers and processors, food packers, brewers and bottlers, rock product and metallic and non-metallic mineral mills, atomic energy and government groups. These groups have been contacted regularly for over 25 years, 11 states coverage. If you have equipment or services to sell and need these contacts, for full information, write:

H. L. HEAKIN CO., INC.
1007 Gough Street
San Francisco, California

GROCERY—MEATS

in town of 4,000 near Gary, Indiana: Mod. brick-tile bldg.; also processes meats and sausage; comp. mod. equip.; Grossing $120,000: Room for expansion in wholesale busi. Only $18,000 for this excellent investment.

HEINZ, JOHNSON, DUNN, & ASSOC.
1 N. LaSalle Dept. 6502 Chicago 2

SPICE GRINDER

Excellent opportunity for well trained and competent man versed in operation and maintenance of various types of grinding and milling and processing machinery, for nationally known spice house located in Northern California.

Desirable age bracket 35-45 years, with several years continuous experience.

Forward full qualifications, record references, salary requirements.

P-5622, Food Engineering
68 Post Street, San Francisco 4, California

COURSES IN FOOD TECHNOLOGY

a. Mathematics and Chemistry of Food Technology
b. Food Analysis
c. Nutrition
d. Canning
e. Freezing
f. Preserving
g. Inspection and Grading according to U. S. D. A. standards
h. Mold Counting and Insect Examination

MEN OR WOMEN: VETERANS OR NON-VETERANS: NIGHT CLASSES

Highly qualified instructors with practical experience and degrees in their respective fields.

MIAMI SCHOOL FOR FOOD PROCESSING SPECIALISTS
P. O. Box 383, Coral Gables, Florida
Telephone: 87-5881

FOR SALE

SHRIMP PROCESSING PLANT

With Ice Manufacturing Facilities.
NEAR NEW ORLEANS, LA. TERMS.

SUPREME FOODS, INC.
PRINCETON, ILLINOIS

WANTED

(Additional Wanted Advertising on page 218.)

FOOD PLANT WANTED

We are now manufacturing over $20,000,000 in various lines and wish to expand by acquisition of assets or stock of one or more industrial companies. In our negotiations the sellers' problems and wishes will receive full consideration. Present personnel will normally be retained.

Address all replies
"Confidential" C. J. GALE, Sec.
233 Broadway, N. Y. 7, N. Y. BA 7-1819

Additional Position Vacant Advertisement on the following page.

OUTSTANDING FLAVOR CHEMIST

•

Increased business again requires that we augment the staff of our flavor laboratories, and has created an opportunity for a flavor creator of exceptional ability.

The person we are looking for must be experienced, imaginative and have a full knowledge of flavoring materials and their application to food products. To such a man we offer a life-long connection with ample remuneration.

We would appreciate receiving full details by mail, including age, previous experience and, if available, samples of creations entirely your own. After study, personal interviews may be arranged.

•

ALVA FLAVORS DIVISION OF

van Ameringen-Haebler, Inc.

521 WEST 57TH STREET, NEW YORK 19, NEW YORK

FOR SALE

AMMONIA COMPRESSORS: 1 York 9x9 with syn motor and exciter No. 32132. 1 York 6x6 with syn motor and exciter No. 60998. 1 York 5x6 with syn motor and exciter No. 60999. 1 York 5x5 with syn motor and exciter No. 59948. 1 York No. 52843. 1 Baker 4x4 with Cont. self-starting induction motor No. 34-9A.

OTHER AMMONIA EQUIPMENT: 1 Receiving tank 30"x12'. 1—50 ton capacity shell and tube condenser. 1—20 ton capacity shell and tube condenser. 1 Shell and tube brine cooler automatically controlled with 2 pumps.

AIR COMPRESSORS: 1—Hasselberg 7x6 No. 102050 with master motor. 2—Nash Hytor 4.3 with LA motor. 1—Storage air tank 4'x12½'—125 lbs. per sq. in.

TANKS GLASS LINED STEEL STORAGE: A. O. Smith hori. completely fitted with outlet valves and manholes.
4—27,900 gals. cap. ea. 11'3" dia. 41' l.
4—13,950 gals. cap. ea. 8'2" dia. 36'6" l.
4— 6,975 gals. cap. ea. 10' dia. 12' l.
2— 6,810 gals. cap. ea. 10'3" dia. 12' l.

LASTIGLAS LINED—HORI.
8—23,126 gals. average cap. ea. 11' dia. 31' l.

LASTIGLAS LINED—VERTICAL
1—4030 gals. cap 9' dia. 10' h.
1—2790 gals. cap 8' dia. 8' h.
2—1860 gals. cap ea. 9' dia. 10' h.
2— 930 gals. cap ea. 6' dia. 10' h.

MAMMUTH LINED HORI.
12—9145 gals. average cap ea. 7' dia. 31' l.

GLUER: Automatic gluer, Standard Knapp No. 429, No. 10228, machine No. 10228 and compression units.

CAN FILLER: Meyer, 34 spout, Canco 440-BGF No. 55932, Class 36-4.

CAN UNSCRAMBLERS: 1—American Can unscrambler and rinser.

Call or write J. Bowers or R. J. Asbeck

FOX BREWING COMPANY
320 Ottawa Ave. NW
GRAND RAPIDS MICHIGAN
Phone 9-4101

FOR SALE
50—36" x 54" Skid Platforms
300 gal. Copper Still with copper condenser and copper tank
80 qt. 4-speed Hobart Vertical Mixer
#76 Enterprise Food Grinder, belt driven
250 gal. Copper steam jacketed kettles for 100 lbs. working steam pressure
SAVAGE BROS. CO.
2633 Gladys Ave., Chicago 12, Ill.

FOR SALE
1—2000 GALLON CHERRY BURRELL
Stainless Steel lined horizontal, cylindrical storage tank with agitator and 3" cork insulation.
HERSHEY CREAMERY COMPANY
Box 121, Harrisburg, Penna.

FOR SALE
1 Tank, stainless, vacuum, jacketed, 1000 gal. cap.
4 Tanks, stainless, square, open top, 100 gal. cap.
5 Tanks, welded, Lastiglas lined, 5300 to 7500 gal. cap.
1 Tank, aluminum, open top, dished bottom, 300 gal. cap.
Stainless jacketed kettles, 40 to 80 gal. cap.
L. E. GLICK & CO.
626 BROADWAY, CINCINNATI, 2, OHIO

FOR SALE
Cherry-Burrell Viscolizer
1800 GPH, 800 P.S.I. max., 25 HP, originally used to homogenize tomato juice.
Any reasonable offer accepted.
Box 921 Syracuse, New York

For Rent — Complete
POTATO CHIP PLANT
Building Ferry Machine
Packaging Equipment
New York City Area
FR-6191, Food Engineering
330 W. 42 St., New York 36, N. Y.

WANTED
TO EXPEDITE PRODUCTION

Food Processing Equipment including Aluminum and S/S Kettles, Mixers, Vacuum Pans, Dehydration equipment, Grinders, Elevators, Stills, Colloid Mills, Conveyors, Filters, Packaging Units, Wrapping Machines. Will consider a set up plant now operating or shut down. When offering give full particulars.

P. O. Box 1351
Church Street Sta., New York 8, N. Y.

WANTED
Capper, World B-Line Labeler and Horix Filler, capacity 40 to 50 one-gallon jugs per minute. Give full particulars as to condition, age, model and price.
P. O. BOX 5086, DALLAS 2, TEXAS

If there is
Anything you want . . .
that other readers of this paper can supply
Or—
Something you don't want
that other readers can use, advertise it in the
SEARCHLIGHT SECTION

OVERSTOCKED UNION

No Reasonable Offer Refused

IMMEDIATE DELIVERIES

Rebuilt Machinery — Established 1912

International Stainless Steel Straightline Vacuum Filler, with automatic Feeder.
Resina Model LC automatic Capper.
Capem E4F 4-Head Rotary Capper.
CRCO New Way MH and Burt adjustable Wraparound Labelers.
Baker Perkins BB, JNM and Readco Heavy Duty 50 to 150 gal. Double Arm Jacketed Mixers, Sigma or Fish Tail Blades.
Day and Robinson 100, 800, 1500, 2000 lbs. Dry Powder Mixers and Sifters.
J. H. Day 75 gal. Imperial Double Arm Steam Jacketed Mixer.
Day, Ross Pony Mixers 8 and 15 gals.
B. P. type 3500 gal. Steam Jacketed Double Arm Mixer.
Day 650 gal. Jacketed Jumbo Mixer.
Stokes, Day, New Era, Hottman Mixers, 2 to 3500 gals., with and without Jackets, Single and Double Arm Agitators.
Baker Perkins 150 gal. Unidor Steam Jacketed Double Arm Mixer.
Tri-Colloid #5 Mill and Homogenizer.
Mikro 4TH, 3TH, 1SH Pulverizers; Jay Bee, Schutz O'Neill, Stedman Mills.
Allis Chalmers, Great Western Sifters.
Colton 2, 3 Rotary Tablet Machines.
Pony M, ML Labelrites: Ermold, World semi, fully automatic Labelers.
Stokes & Smith A Transwrap Filler.
S. & S. G1, G2 and G6 Auger Fillers.
F. J. Stokes HG88 Duplex Auger Filler.
Whiz Packer and Spee-Dee Fillers.
Triangle Package Models G2C, G2S, N2CA Elec-Tri-Pak Fillers.
Horix and Elgin S.S. Rotary Fillers.
Filler 4-Head S.S. auto. Piston Filler.
Stokes, Colton semi auto. and auto. Tube Fillers and Closers.
Doughboy auto. Cellophane Bag Sealers.
Standard-Knapp No. 429 Carton Sealer.
Hudson Sharp Campbell automatic cellophane Wrapper.
Hayssen, Package Machy. Co. FA, FA4, DF, CA2; Miller and Scandia automatic. Cellophane Wrappers.
Sweetland, Alsop and Ertel Filters.
Huhn Steam and Gas-Fired Rotary Dryers.
Pneumatic automatic Cartoning Unit, 60 and 30 per min.
Consolidated 13" Macaroni Presses.
Battery of Grimolas and Macaroni Mixers.
Clermont automatic Noodle Cutter.
Clermont Reversible Dough Brake.

Additional Information and Prices Available on Request

UNION STANDARD EQUIPMENT CO.
318-322 Lafayette Street New York 12, N. Y.

TOP PRICES PAID FOR YOUR SURPLUS EQUIPMENT

WE HAVE IN STOCK FOR IMMEDIATE DELIVERY THE FOLLOWING TYPES OF EQUIPMENT

BOILERS
CANNING
CONFECTIONERY
DAIRY
FILLERS
MATERIAL HANDLING
STAINLESS-STEEL JACKETED KETTLES
MEAT PACKING
MIXERS
MOTORS
PULVERIZERS
PUMPS
REFRIGERATION
SCALES
STAINLESS-STEEL TANKS
LARGE & SMALL STEEL TANKS

Consult Us for Your Food Processing Equipment Send Us Your Inquiries
We Buy One Item or Entire Plants

AARON Equipment Company
1147 So. Ashland Ave., Chicago 8, Illinois
PHONE: CHesapeake 3-5300

YOUR PREFERRED SOURCE FOR GOOD REBUILT EQUIPMENT

New FMC 17 Spout Rotary Syphon Gallon Filler
Urschel Model B Dicer with Motor
FMC Hand Packed Filler complete unit
Pneumatic Scale Packaging Line—Brand new—having Auto., Carton Feeder, Top & Bottom Sealer, Filler & Compression Unit
4 Transwrap Machines, Model A & BB Complete
Sprague Sells SS 6 Spout Rotary Filler, Model 60 fills from #1 to #10 Containers, complete
Knapp & Burt Can or Jar Wrap Around Labelers
Pfaudler Glass Reactor 30 gal. & type 347 SS
Capem & Resina Automatic Cappers
New & Rebuilt Ribbon Blenders Steel & SS
New & Rebuilt Kettles, Tanks Steel & SS
All Sizes—Send Us Your Specifications.

WHAT HAVE YOU FOR SALE?

For Better Buys & Service
Phone SOuth 8-4451—9264—8782

YOU CAN BANK ON

EQUIPMENT CLEARING HOUSE, INC.
289-101h ST. BKLYN 15, N. Y.

YOUR BEST SOURCE—LARGEST STOCK in U. S.

COOKERS & COOLERS

2—A-B #1-303-#2 Cookers 1800 & Coolers
A-B #1-303-#2 Cooker 2200 cans holding
Berger-Carter 1-303-#2 Cooker-Cooler 960-450
A-B #2-2⅛ Cooker-Cooler, 1850—925 cans holding
Sprague-Sells #2-2⅛ Cooker-Cooler 1452-726
A-B 8 Oz. Cooker-Cooler, 2400-400 cans cap'y
A-B #10 Cooker-Cooler, 300-200 cans cap'y

EXHAUST BOXES

A-B single deck up to #10, 319 cans on #10
Sprague Sells up to #10, 350 cans holding
A-B Double deck @2-2⅛, 12" discs 1058 cans
A-B Single Deck, 235 cans holding cap'y

FILLING MACHINES

FMC M&S 6 pocket for #10, Stainless contact
M&S 10 pocket S.S. contact for small cans
M&S 6 pocket #2-2½ cans, bronze contact
Ayars 16 pocket for 46 Oz. juice cans
Mayonnier 25 spt. set for baby size cans
Hansen 8 Pocket Pea & Bean, 303x406 cans
FMC 1½ pocket, chg pts for #2, 46 Oz., #10
FMC 18 valve juice Filler 202 & 307, Bott fill
A-B Hand Pack, 8 Oz., #1-2, #2-2½ change pts
Horiz 18 Sprout Rot Auto set for Tom Paste
Karl Kiefer Vari-viscos, sizes to #10 cans
Geyer Piston Fillers, all sizes in stock
Judge 20 Valve Syruper for #2½ cans
A-B 20 Valve Syruper, now set for #2½ cans
Sprague Sells 8 Valve, for #2-2½ can sizes
Sprague Sells 8 Valve, chg pts for #2½ & #10
Sprout Waldron Monarch sack Filler, to 100#

FILTERS

Sperry Bronze 18" with 25 recessed plates
Sperry Lead 12", with 15 plates & Frames
Hiller 20" iron with 25 recessed chambers
Shriver 24" iron with 34 chambers Pl & Fr
Shriver 30" iron with 30 chmbrs Pl & Fr
Sperry 36" iron Hydr Cl, 60 Ch Pl & Fr
Alsop 8 disc Filter, 12" dia plates
Kimco 8'x8' Rotary Vac Cont fully equipt
Sweetland #7 with 42 lvs 30" dia 2" centers
Oliver Precoat 3'x6', iron contact parts

PACKAGING EQUIPMENT

Pneu Scale Auto Line for Cartons; opener, liner top & bottom gluer & sealer
Ferguson Packomatic auto line; operner, filler gluer & Sealer. Used on soap chips
8—Simplex Celophane Bag Makers, like new
Knapp line, Dumper, unscrambler, labeler case packer, gluer & Sealer
Jones Cartoner, 1 Oz to 6 Oz bottles. Opens carton, inserts folder & bottle
Knapp #429 Semi Auto Carton Gluer & Sealer
Pneumatic Scale Tite-Wrap, pkg 1-⅝x1-¾x5-⅝
Packomatic Semi Model PT-1 Filler & Sealer
Labelers, Fillers, Cappers, Casers. All sizes

RETORTS

Reid Horizontal Qk Opening 54" dia 15'6" long
5—Can Pack Vertical 40" x 72" New shells
4—FMC vertical 2 basket 42"x60" (new)
3—Horizontal 5'x16', with qk opening doors
4—Dundon Horizontal 54"x22', eccentric lock
15—FMC 4 basket Vertical, 42"x93". Excint Con

MISCELLANEOUS

Krenz S.S. Vacuum Pan, 6'x12' with 400' Caldr
8—Copper Vac Pans, all sizes & priced low
Reitz RD-18 Disintegrator with 50 HP motor
Scalder, Draper type 36" wide 20' long
Packomatic top Gluer & Sealer for 15 Oz Cartn
Rotex Sifter #42, 4'x9' each deck. Two decks
Sterling Slicer model EM-5A with belt
Monel Tank 6'x12' Vac or Press with coil & std
Berlin Chapman Pea & Bean Balncher, 10' long
AT&M 30" Susp Centrifugal, 7½ HP Motor, bot dp
3—Dunkley Cherry Pitters, large size
Atlas Pac Lye Peeler 42" wide 8' long Draper

OVER 10,000 ADDITIONAL ITEMS IN STOCK

MACHINERY AND EQUIPMENT COMPANY
514 Bryant Street • San Francisco 7, Calif.

FMC

LIQUIDATE YOUR SURPLUS EQUIPMENT BEFORE INVENTORY TIME

Write off your idle surplus machines; equipment gathering, dust, rust and cobwebs, does no good for you nor for the war effort. And yet, it may be hidden treasure for some plant which can use it. Turn it into CASH before the first of the year.

SEND US YOUR LIST FOR QUICK ACTION!

FMC will buy it for stock, immediately or quickly find a home for your idle machine, where it may again serve productively.

Offerings From Stock

MIXERS

New and Rebuilt Dry Powder Mixers of the Ribbon Type in Stainless and Mild Steel in all sizes Heavy Duty Mass Mixers, both steam jacketed and unjacketed up to 150 gal. Tumbling Barrel Batch Mixers.

Stainless KETTLES—TANKS

Large stock on hand of Jacketed Kettles up to 300 gal. Single Shell Tanks up to 3000 gal.

DICERS—CUTTERS—CHOPPERS—SLICERS

Urschel Model B in S/S; Sterling EM-1D American Relish Cutters; Smith Silent Cutters; Boutell S/S Slicers; Peelers; Biro Stainless Steel Meat Saw, 1½ HP.

DRYERS—DEHYDRATORS

2 S/S Atmospheric Drum Dryers 5'x0'.
1 Double Drum Dryer; 28"x5'.
Proctor & Schwartz Apron Dryer 40'.

PULPERS—FINISHERS—JUICE EXTRACTORS

Langsenkamp S/S Model B†EZ Adjust Pulpers with 7½ HP motors; others.
Chisholm Ryder S/S Model B Extractors

FILLING EQUIPMENT

M. & S. 10 Pocket S/S Can or Jar Fillers.
Mojonnier S/S 14 Head Vacuum Filler.
Filler Mach. Co. and Elgin Piston Fillers.
Juice Fillers by FMC, Horix, Berlin Chapman. Dry Powder Fillers by Stokes & Smith.

LABELLING EQUIPMENT

Wrap around Can and Jar Labellers by Standard Knapp, Burt, Kyler, Nu-Way etc. Spot Labellers semi and fully automatic.

MISCELLANEOUS

Standard Knapp Casers or Boxers, Case Printers; Aut. Gluers and Sealers; Pasteurizers, Washers, Colloid Mills, Coolers, Exhausters, Centrifugals, and hundreds of other items. WHAT DO YOU NEED?

FRED R. FIRSTENBERG, Pres.

FIRST MACHINERY CORP.
157 Hudson Street,
New York 13, N. Y.

NOW LIQUIDATING

equipment from closed breweries

AT MARION, INDIANA, we offer excellent bargains in grain handling equipment including a Dracco pneumatic system; ammonia compressors with condensers and several Niagara Cooling units; cookers; filters; pumps; case conveyor (power and gravity); office and machine shop equipment; also 600,000 gallons total capacity welded steel tanks (brewery lining) from 3500 gal. to 12,500 gal. sizes.

AT CLEVELAND, OHIO, we offer 47 vertical closed top cypress tanks from 3,700 gal. to 10,000 gal. sizes.

AT NORFOLK, VA., we offer 15 horizontal welded steel tanks (Lastiglas lined); 2 welded steel grain bins 4900 cu. ft. each; cookers; filters; case conveyor, etc.

FOR SALE FROM STOCK

70—Stainless Steel and Stainless Clad Steam Jacketed Kettles, 10, 40, 60, 80, 100, 150, 500 gal.
3—Lee 300 gal. T316 stainless steel salad dressing starch base cookers, water jacketed, double motion agitators.
9—3000 gal. Horiz. Stainless Steel Tanks, insulated & agitated, sanitary fittings, excellent for transporting, storing or holding milk, food products, wines, etc.
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1—Fletcher 40" S.S. Suspended Centrifugal.
1—Sperry 24" x 24" Aluminum P & F Filter Press.
6—Rodgers new Mixers 400 to 3000#.
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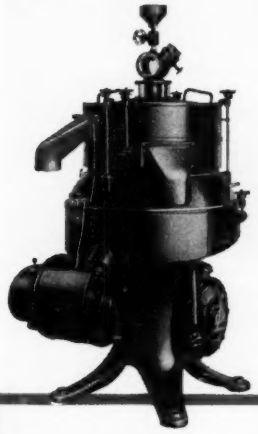

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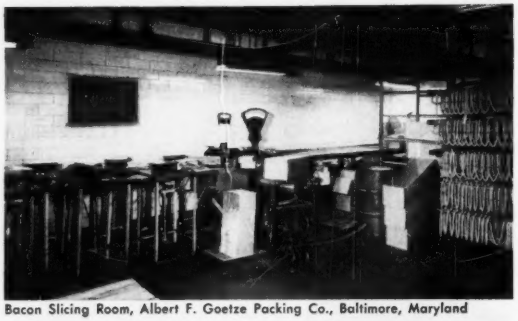

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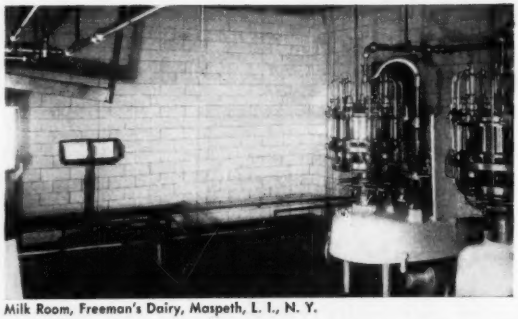

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WHAT THE NUMBERS MEAN

The number after each item in the list is the number of the page it appears on. When more than one item is described on a page, prefix capital letters indicate position: L,R,T,B,C (left, right, top, bottom, center). Small letters are used to separate several products described in an advertisement. Capital letters following page numbers identify products and literature described in monthly editorial departments.

The same numbers appear on the postcard in numerical order.

Described in this issue:

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Flask 116A
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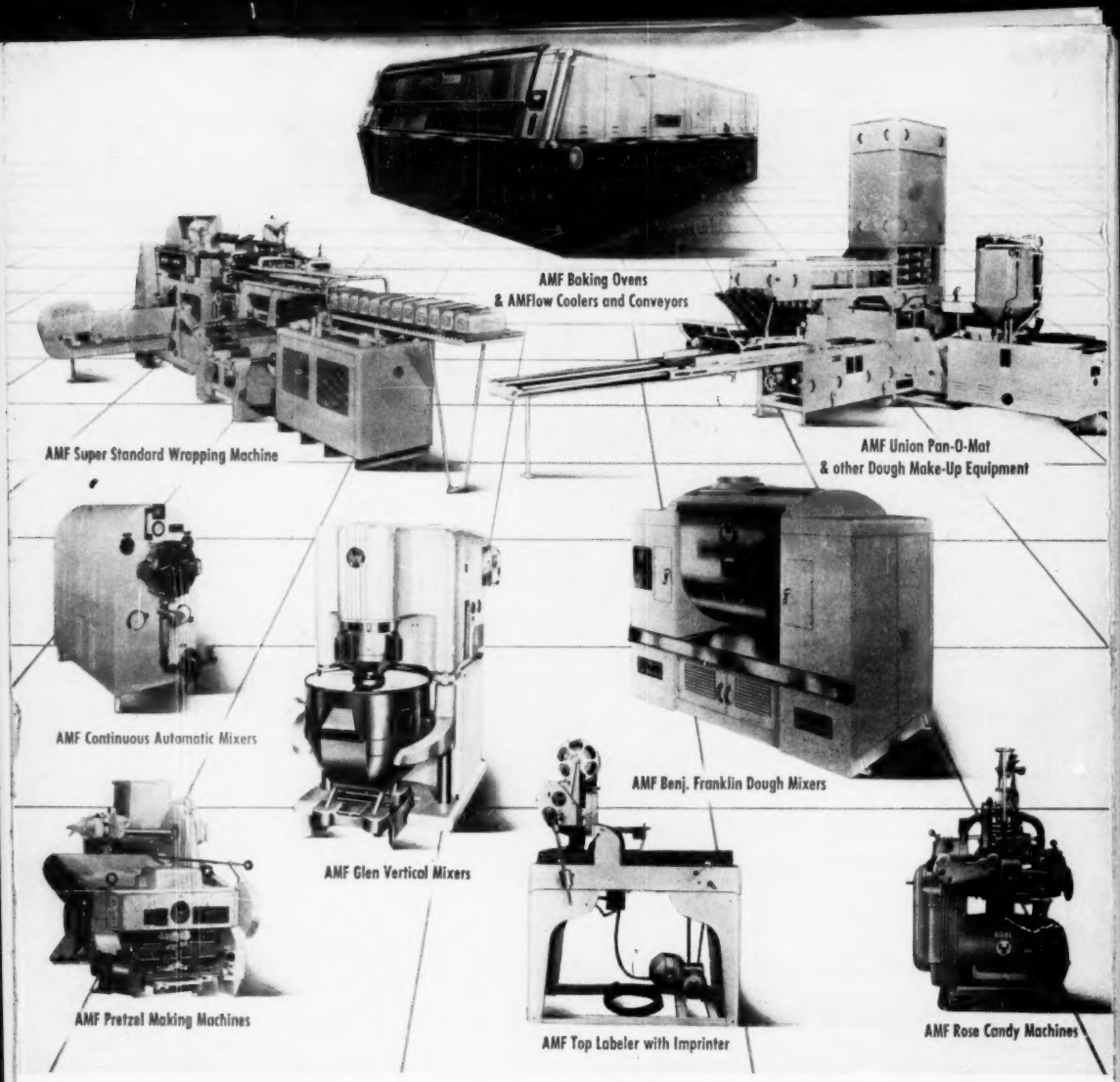
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